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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Current Issue.

CONTINUING his history of the Queensland sugar industry, Mr. Easterby describes interestingly its development on the technical side. Another instalment of Mr. Currie's paper on the Brown Cutworm is added. Mr. Quodling's account of pasture experiments on newly reclaimed pear land at Palardo will be welcomed by all interested in the extension of land settlement. Seed maize improvement work is reviewed by Mr. McKeon. Major Cory has some seasonal notes on mammitis and lung worms in calves; while diseases of the pig are further discussed by Mr. Shelton. Mr. Carew continues his observations on farmers' sheep and wool, including the management of small flocks. The prospects of extending Australian trade with Eastern Asia are reviewed by Colonel D. E. Evans, who, after attending the recent World's Engineering Congress in Tokyo, toured extensively in Japan, Korea, Manchuria, and China. Well supplied regular features make up a very readable issue.

Native Flora.

HEARTY approval was given by Parliament to a Bill for the preservation of our native flora, which was introduced recently by the Minister for Agriculture and Stock (Mr. H. F. Walker). Mr. Walker said that the measure was one that had been needed for a long time past. On the numerous islands along the coast of Queensland there was a great wealth of vegetation, including staghorns, elkhorns, orchids, and ferns; but many of the islands had been denuded of their floral wealth for private gain. The more general use of motor cars and motor boats had aggravated the evil. It was proposed under the bill to protect our beautiful and, in many respects, unique vegetation, not only in the islands and the coastal districts, but also that of other parts further inland.

Agriculture in Queensland.

IN his annual review of departmental activities presented to the Minister for Agriculture and Stock (Mr. H. F. Walker), the Under Secretary (Mr. E. Graham) says that the past year was remarkable for a steady agricultural advance in Queensland. A general movement towards higher production standards was also apparent in the period under review.

In a State like Queensland, with its enormous territory and wide range of soils and climate—temperate, sub-tropical, and tropical—there can be little uniformtiy in rural conditions. The agricultural situation for the year was, however, much more even from the standpoint of production than the preceding one, and reviewing the whole period the brighter aspects predominated. Substantially larger returns were obtained from all sources of rural wealth, and present prospects are a sound basis for healthy optimism. There are indications, too, that the current agricultural year will provide further evidences of complete recovery from a series of adverse seasons. This is demonstrated by increased production, and numerous signs of progress in the improvement of manufacturing processes and marketing arrangements.

New gains have been recorded in field efficiency as well as by results of well-directed efforts towards more systematic marketing of primary products. There is a general realisation, however, that the farming problem is not solely one of production; it is also distinctly one of marketing. Price depression in some commodities was a natural consequence of a glutted domestic market. The year's experience shows that the demand side of the equation calls for further careful study and satisfactory adjustment. The strengthening of marketing machinery by which products are fed adequately into the ordinary trade channels is required, to avoid over-supply or shortage and keep prices at a reasonable level. The need of economic information on which wise adjustment may be based is becoming each year more insistent.

It is pleasing to report that farmers themselves are displaying a tendency to study closely influencing commercial factors, and also to look for and apply economic intelligence in planning their seasonal programme. This is being done much more than formerly, and from a development of this tendency has arisen a call for more relevant information on crop demand and methods of disposal.

There was a considerable expansion of acreage during the year, and crops generally moved to market in increasing volume.

In departmental activities, considerable progress was made, and a wide scope of instructive, constructive, and administrative effort was successfully covered.

Crop Yields for the Year.

THE wheat yield for the year was the highest yet attained in Queensland, and surpassed all expectations. The harvest returns were 4,235,172 bushels, as against 2,515,561 bushels for the previous year. The grain was of good milling quality. This fine result was due, apart from timely rains, to careful and thorough cultivation, which is becoming characteristic of wheat-farming in Queensland. Good progress was made in wheat-breeding at the Roma State Farm. Varieties bred there were sown largely. They have proved, in the main, good yielders, and are becoming more favoured each season. The value of the wheat breeding and extension work of the Department is becoming increasingly evident. Varieties and types evolved have survived searching tests under practical field conditions. Breeding plots were established at several suitable centres, and the varietal trials entered on thereat represent a continuity of the work carried on from season to season. The system, in brief, is the testing of new Roma crossbred wheats under actual working conditions, the elimination of undesirable varieties, and the propagation of the selected strains. Included in the trials are 240 new Roma crossbreds and forty standard varieties.

A seed wheat improvement scheme approved by the Department and the State Wheat Board was made effective. Satisfactory results were obtained, both as regards yield and general field behaviour of the wheats involved. Growers have co-operated heartily in this work, and purpose extending their acreages as a result of the successful operation of this scheme.

In the Central Division grain-growing is extending gradually, particularly in the Dawson Valley. The possibilities of a more rapid extension in Central Queensland are being explored by the Department, and to that end varietal trials are being carried out in different localities. Last season Dululu on the Dawson, and Retro in the Capella district, were the main centres of these activities. Though the rainfall was very light, satisfactory yields were bagged.

The usual annual crop competitions were held in the Warwick and Toowoomba districts; and as a stimulus to farming efficiency, their importance is becoming

more widely recognised. Their educational value is also appreciated by all engaged in grain production.

Although the presence of "flag smut" was reported from many localities in the 1928 season, it is noteworthy that in the next succeeding crop very few individual stands were affected, and where there was an appearance of disease it was present in only a minor degree. This favourable condition may be attributed to the acceptance of precautionary measures advocated by the Department for checking the disease, and to the nature of the season.

The consensus of opinion is that marketing arrangements have improved under the recent agreement between the Wheat Board and the millers. This agreement has also had a stabilising effect on prices.

A considerable increase in acreage under crop is expected this year. The present crop prospects are good, though early planted wheat is too far advanced for this time of the year, as a result of over-generous winter rains.

Weather conditions during the planting season were not generally favourable for maize, and early crops were consequently light. The late-sown crops had the advantage of the December rains and prospered accordingly. Market values were high, especially when only limited supplies were available at the beginning of the season. Heavy summer rains marred the crop prospects on the Atherton Tableland. "Rust" occurrence was one of the results. A dry February, however, helped to create a favourable balance of seasonal circumstances.

Satisfactory progress is being made in seed maize improvement, and the demand for seed of improved varieties evolved by departmental officers is constant, and available supplies are eagerly sought. The value of this work was made manifest at the Royal National and other shows where exhibited grain illustrated the success of the departmental breeders. The principal varieties of maize now grown in Queensland are of departmental origin. This is the outcome of systematic breeding and regular distribution of pure seed.

Upwards of 100,000 bushels of malting barley were produced last season on the Darling Downs. Individual yields were high and the quality was uniformly good. The whole crop went into local consumption. The current season's sowing has had the advantage of an excellent start and high yields are anticipated, also improved marketing arrangements under the Barley Pool Board which was constituted in the course of the year. The development of improved varieties is in hand. Field officers are testing some very promising barleys, including several new crossbreds, the product of the Roma State Farm. Special attention is being given to these comparative tests in order to assist in the revival of barley-growing on the Downs. For the same purpose seed of the Californian brewing type has been imported from England for trial and propagation.

The testing of suitable varieties of oats for the purpose of determining their qualities for grain, hay, and green fodder, respectively, was continued during the year with satisfactory results.

Production of canary seed increased very substantially, 280 tons being harvested, as against 50 tons, approximately, in the previous year. As this crop is grown in no other State and annual Commonwealth requirements are about 1,500 tons, it certainly warrants more attention from Downs farmers. The acreage planted this year promises, on present prospects, to produce sufficient seed for Australian needs. Its grazing value, too, is considerable, though it is susceptible to dry-season checks. In furtherance of our efforts to bring this crop into more general and regular cultivation, special plots were established successfully for the purpose of raising enough seed of an improved strain to extend its cultivation.

The cultivation of root, fodder, and other field crops is covered by Mr. Graham's report; also fertiliser trials, mainly with winter fodders. Increased attention has been given to onion-growing in the Central Division on a scale large enough to supply local and Northern requirements. For the guidance of farmers, variety trial plots were established in several centres, and satisfactory results were achieved.

In the course of the year consideration was given to the possibility of opening up new furrows in agricultural production in Queensland, and the extension of tobacco cultivation has been advanced substantially. Progress was made in experimental work, particularly in the northern division of the State.

In Queensland, we have a promising field for the production of bright, flue-cured leaf of good texture and smoking quality. Results of our new experiments, so far, go to show that we may in the not far distant future be able to supply an appreciable proportion of the tobacco leaf required for Australian use. The economic importance of this prospective development may be measured by the fact that tobacco to the value of more than £2,000,000 is imported into the Commonwealth annually.

THE QUEENSLAND SUGAR INDUSTRY.

By H. T. EASTERBY, Director, Bureau of Sugar Experiment Stations.

PART XI.

(c) Mills and Milling Work.

THE history of the rise of sugar-milling in Queensland is an intensely interesting study. Comparatively speaking, it is not so many years ago that sugar manufacture was commenced in this State on a crude and insignificant scale, and when one looks back from the fine up-to-date sugar-mill at Tully, for instance, costing some £750,000 and capable of crushing over 200,000 tons of cane in a season, to the humble crushing plants of the very early days worked by horse or cattle power, it is apparent how far we have progressed in the last fifty or sixty years. But to the pioneers of the sugar industry in Queensland, those who worked hard early and late in clearing land, planting, and making sugar, a due meed of credit must be given. They took all the risks of an unknown industry, and we have but followed in their footsteps with better knowledge and improved facilities.

As a matter of interest to the present-day manufacturers of sugar, a description of one of the old early primitive sugar-mills at St. Helena, driven by horse power, is given below, taken from a book on the sugar industry published in 1870, and written by Mr. Angus Mackay:—

> "The mill now at work at St. Helena is a low-priced but good machine for parties cultivating from 10 to 30 acres of cane. It is a vertical horse-power mill, obtained from Messrs. Smellie and Co.'s foundry, Brisbane, at a cost of £120. This mill consists of three vertical rollers, each 18 inches in diameter, 15 inches high, and well secured with iron bolts through cast-iron plates at the top and bottom. To secure an elevation sufficient for the fall of the juice into the clarifiers and from the evaporating pans, the mill is erected upon rising ground, by which means a fall of about 5 feet was obtained, and this was found sufficient for all purposes. A passage 10 feet wide and 6 feet high should be made under the horse walk, which allows of a dray being backed clean up to the rollers. Megass and other refuse can be taken away by the same means. The mill is placed about 20 feet from the end of the boiling house to give the horses a sufficiently roomy walk. The horse shafts or poles, 18 feet long, are four in number, so that two or more horses can be employed at one time. For a mill of this power six horses are necessary to work (say) ten hours a day; and if kept steadily at work during that time sufficient cane could be crushed to produce liquor for about half a ton of sugar. The boiling house at St. Helena is 40 feet long by 25 feet wide, with 12-feet wall plates; it is built of hardwood and pine and covered with shingles. There are six windows on each side, part Venetian work and part glass, with an open space of about 18 inches on either side, near the eaves, the full length of the building; there is also a turret, 3 feet square, on the top of the building filled with louvre boards, which completes the ventilation. In this building are fitted the clarifiers, evaporating pans, and tache. The two clarifiers, each capable of containing 200 gallons, are at the end nearest the mill and connected therewith by a galvanised-iron pipe, through which the juice is conveyed. They are set in brick-work with separate furnaces and flues, the latter leading into the

main flue. They are so placed that the bottoms of the clarifiers are 4 inches above the top of the evaporating pans, and at a right angle with them. The furnace, tache, and evaporating pans run along about 4 feet from one side of the building; the whole of the pans are set in brickwork, with a main flue passing underneath them and between the clarifiers. The furnace for this battery of pans is of Brisbane firebrick; it is 7 feet 6 inches long, 2 feet wide, and 2 feet high, arched over with a curve 5 feet 6 inches by 2 feet; the tache hangs at the end of the furnace, the bottom about 2 feet above the bars, whilst the brickwork is arranged for the fire to play all around it. The end of the evaporating pans is 14 inches from the lip of the tache. The evaporating pans, of iron, are joined together, and present a surface 18 feet long, 3 feet wide, and 18 inches deep, which is divided into three compartments. The flue passes under the whole length of them, between the tache and the clarifiers, having a damper at the far end. This flue is 2 feet wide and 18 inches high, and the whole range is built so that the furnace, tache, and evaporating pans fill up the space between the end of the building and the clarifiers. The length of the flue is 45 feet from the front of the furnace to the base of the chimney. The chimney, 4 feet 6 inches square at the base, is of brick on a stone foundation and is 29 feet high, with a 6-inch batter on each side. The furnace door is outside of the building. Brickwork is carried 12 inches above the lip of the tache and is then covered with sheet lead down to the lip, the form being dished out on the side nearest the evaporating pans, so that the syrup, when boiling over, may flow into them. Both the evaporating pans and the tache may be at the same elevation. The edges of the evaporating pans are bound round with hardwood battens to keep the iron from bending. The coolers are 5 feet by 4 feet at the top and 12 inches deep, bevelled on either side about 3 inches; they are of $1\frac{3}{4}$-inch cedar, and answer well, although the wood for the first day or two slightly discolours the sugar; this, however, may be avoided by filling them with boiling water two or three times. The drainers are made of the same material and are 5 feet long by 3 feet wide and 18 inches deep, bevelled 6 inches, with a false bottom of perforated zinc and a hole at the end for molasses to escape. We are now trying another plan, which, I fancy, will drain the sugar better still—that of putting canvas bags for drainers over false bottoms made of narrow battens. There are, however, so many different drainers in use that experience is necessary to determine the kind most suited for particular sugars. For the St. Helena mill canes about 4 feet in length fit best; when of greater length they are inconvenient when passing through. Two, or sometimes three, pieces are sufficient between the rollers at a time; but these must, each as it disappears, be replaced regularly to ensure uniformity of crushing without more than ordinary wear and tear to the machinery. As the juice reaches the mill bed it runs into galvanised-iron piping, attached to which are two strainers of fine wire gauze, and thence into the clarifiers. After the bottom of one of the clarifiers has become covered with juice a slow fire is lit underneath, and increased as the clarifier fills, the heat being regulated accordingly. When a clarifier is full quicklime, previously prepared by mixing it with water until it has attained the consistency of cream, is added, according to the acidity of the juice, and tested by litmus paper, and if the paper

retains its original tint sufficient lime has been added to the juice. No stated quantity of lime can be used with certainty in any particular variety of cane as its acidity varies considerably; each pan is therefore tested in this manner. We have used lime made from both coral and shells, but find neither answers so well as stone lime from Rockhampton. Lately I have used bisulphite of lime, placed in a small receiver, over, and allowed to drop into the clarifier at the rate of about three drops per minute, or about two drops to the gallon. This is found to be a great improvement, and about one-third less lime is necessary in the liquor afterwards. The addition of bisulphite makes the sugar cleaner, and, in the event of the juice having to remain in the clarifier for some time, it is prevented from fermenting. It is, therefore, a decided improvement upon lime temper. When the clarifier is full and tempered as above it is brought up to a heat of 140 deg. Fahr. and stirred well round so as to diffuse the limewater evenly through the whole body; it is allowed to settle and then brought up to a heat of from 190 to 200 deg. and skimmed. The liquor is then allowed to run through flannel bags into the evaporating pans, most of the sediment being retained in the clarifier. Whilst the first clarifier is emptying into the evaporating pans the second clarifier is filling to undergo a similar process. A fire has before this been lit under the tache, which was previously filled with water to prevent it from injury. The heat from this fire having reached the evaporating pans, the liquor is allowed to boil and evaporate in the three compartments up to a heat of 220 deg., by which time it has reached a density of 28 deg. by Beaumé's saccharometer; the water is then removed from the tache and the syrup ladled in from the nearest evaporating pan, and it is then brought to a heat of 228 or 230 deg., but not higher, as the lower the syrup is boiled up to granulation point the better the quality of the sugar, whilst a more intense heat will probably burn the syrup and discolour it. When it has reached a temperature of (say) 228 deg., the fire is withdrawn, the damper put down, and the syrup run through a long narrow pine trough to the coolers on the other side of the building, where it is well stirred and allowed to remain for twenty-four hours. In that time it granulates. From the coolers the sugar is transferred to the drainers, where it is allowed to remain as long as possible, the time required for the drainage of the molasses from the sugar varying with the nature of the drainers and the state of the atmosphere.

"In consequence of the great difficulty of drying sugar from the variableness of the atmosphere, a centrifugal machine is being constructed wihch is intended to work either with a small steam engine or hand labour. Seventy per cent. was mentioned as being good extraction."

As time went on the inadequate horse and cattle mills were abandoned by degrees. These were mostly of a vertical nature.

Horizontal mills consisting of three heavy cast-iron rollers accurately turned and generally slightly grooved on the face and fixed between two cast-iron frames securely bolted to a cast-iron bed plate, which also formed the receptacle for the expressed juice, began to come into use. In a mill of this description two rollers were below and placed parallel to each other and one above. These rollers were from 12 inches to 3 feet in diameter, and the speed found most advantageous for expressing the

juice from the canes was at the rate of 20 feet per minute. The canes were fed from a table, and after being squeezed between the first and top under roller were guided between the top and second under roller by a plate which is still called the "dumb turner." Steam engines were used for driving these horizontal mills, the class of engine most commonly used being the horizontal high-pressure engine—simple in construction, strong and substantial, the working parts being highly finished, other parts being black and painted. It was stated that many preferred to have a highly polished engine, but that such an engine would cost about 30 per cent. more than a black engine, but the bright work cost a good deal more to keep clean.

Steam also began to be used for boiling the juice, and centrifugal machines came into use before 1870 for separating the grain from the molasses, while vacuum pans were being talked about, and at some little time afterwards began to be installed.

It is perhaps as well, as the knowledge of facts concerning the early history of sugar-mills becomes in the course of time more and more difficult to obtain, that I should place on record the names of the earlier plantations or their owners as far as I have been able to obtain same.

NAMES OF OLD PLANTATIONS AND OWNERS (WHERE POSSIBLE) PRIOR TO 1875.

District.	Locality.	Name of Plantation.	Names of Owners.
Southern ..	Nerang ..	Bundall	Holland Miskin & Co.
Do. ..	do.	Birribi	Philpott Bros.
Do. ..	do.	Benowa	R. Muir
Do. ..	Logan and Albert	Loganholme ..	Fryar and Strachan
Do. ..	do.	Sederhoff	Palm
Do. ..	do.	Noyea	Gartside, Muir and Black
Do ..	do.	Pinwells	..
Do. ..	do.	Beenleigh	Davy and Gooding
Do. ..	do.	Yatala	Witty
Do. ..	do.	Helensvale	White and Robinson
Do. ..	do.	Miles and Ardates ..	..
Do. ..	Oxley Creek ..	Francis	..
Do. ..	do.	Jamieson's	..
Do. ..	do.	Berry's	..
Do. ..	do.	Grimes and Co.'s ..	..
Do. ..	do.	Dr. Waugh's ..	..
Do. ..	do.	Ormiston	Hon. Louis Hope
Do. ..	do.	M'Leod's	..
Do. ..	St. Helena ..	St. Helena	Government
Between Brisbane	..	Eton Vale	Canny and Moreton
and Mary-	..	Alford	Farquhar and Dunn
borough ..	..	Waitemata	T. Wood
Do. ..	..	Irrewarra	R. Tooth
Do. ..	..	Yarra Yarra ..	R. Tooth
Do. ..	..	Yengarie Refinery ..	Tooth and Cran
Do. ..	..	Iindah	Ramsay Bros.
Do. ..	..	Iveragh	M. Canny
Do. ..	..	Mona	R. F. Clarke
Do. ..	..	Iwood	C. D'Oyley Aplin
Do. ..	..	Dunrobrum	J. M. Illidge
Do. ..	..	Ferney	P. O'Kelly
Do. ..	..	Frankston	Capt. Jeffrey, R.N.
Do. ..	..	Antigua	Hon. Brown
Do. ..	Tinana Creek ..	Magnolia	..
Do. ..	Maryborough ..	Maryborough ..	Maryborough Sugar Co.

NAMES OF OLD PLANTATIONS AND OWNERS (WHERE POSSIBLE) PRIOR TO 1875—*continued.*

District.	Locality.	Name of Plantation.	Names of Owners.
Mackay ..	Mackay ..	Balmoral	W. Hyne
Do. ..	do.	Medowlands.. ..	Fitzgerald
Do. ..	do.	Davidson's	..
Do. ..	do.	Hewitt's	..
Do. ..	do.	Branscombe.. ..	Martin and Long
Do. ..	do.	Nebia	Ganes and Fitzsimmons
Do. ..	do.	Dumbleton	Lloyd and Williams
Do. ..	do.	Pioneer	Spiller
Do. ..	do.	Foulden	Amherst and Co.
Do. ..	do.	River Estate ..	Long and Co.

In 1880 the sugar-growing and sugar-milling areas were split up as follows:—

1. The Southern district, extending from Nerang Creek near the border of New South Wales to Maroochy Creek (Nambour);
2. The Central or Wide Bay district, from about Maroochy to Bundaberg;
3. The Mackay district;
4. The Cardwell district.

Taking the Southern district first, there were mills at Nerang Creek, several mills about Coomera and Beenleigh, mills at Mount Cotton, Redland Bay, Cleveland, Hemmant, St. Helena, Indooroopilly, Oxley, Sherwood, Bald Hills, Burpengary, Caboolture, Mooloolah, and Maroochy.

The Central sugar-growing district ran north from Maroochy, but there was no sugar-mill before Tiaro, then came mills at Antigua, Tinana Creek, the Mary River, and Maryborough. At Bundaberg there were then three mills.

The Mackay district was a compact locality in 1880 with sixteen sugar-mills working close to one another, chiefly on the Pioneer River.

In the Cardwell district there were two mills on the banks of the Herbert River, and at Cairns there were another two.

At the time Mr. Roth wrote his "Report on the Sugar Industry in Queensland" (viz., in 1880), he said that 114 mills had been started in Queensland.

At that period the manufacture of rum was a side line in Queensland, and in 1875 there were fourteen stills at work; this number was reduced to nine in 1878.

The Gibson family, now so well known in connection with the fine up-to-date plantation and sugar-mill at Bingera, near Bundaberg, commenced the manufacture of sugar first at Doughboy Creek (Hemmant) on the Brisbane River. The plate accompanying this section is of the old mill, and in it may be seen the late Hon. Angus Gibson and his father. At that time and when the Gibsons opened up Bingera there were four sons, all subsequently well known and prominent in the industry—viz., Angus, William, James, and John. Of these, the only survivor is Mr. John Gibson, but the family traditions are worthily carried on by Mr. W. G. Gibson, Dr. A. J. Gibson, and Mr. A. L. Gibson, who manage the Bingera Sugar Company and plantations.

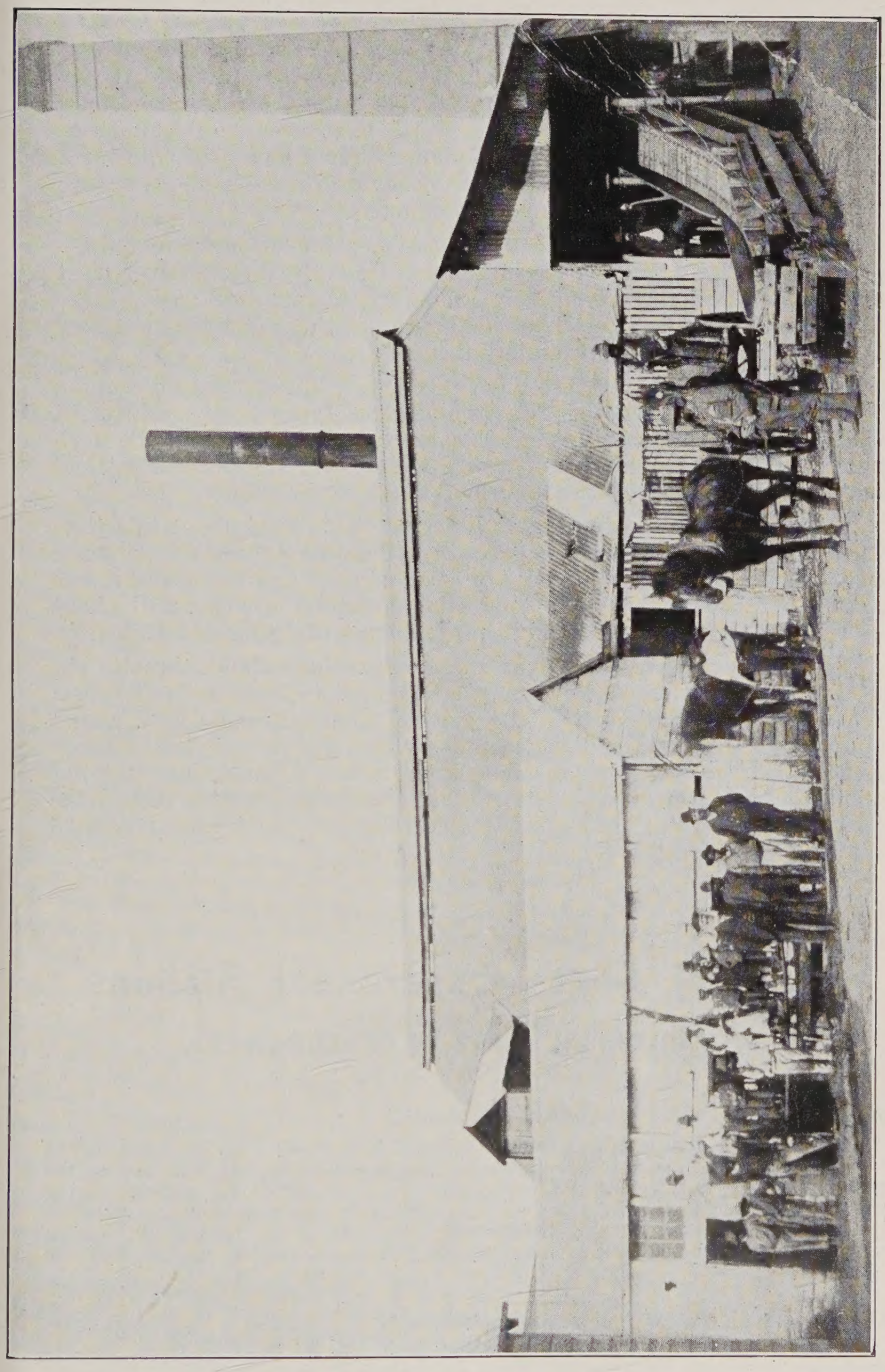


PLATE 134.—GIBSON BROS. FIRST SUGAR MILL, HEMMANT, DOUGHBOY CREEK, NEAR BRISBANE.
Included in the group are the late Hon. Angus Gibson and other members of a family that has contributed much to the success of the sugar industry in Queensland.

At the time of which we are now writing—1878 to 1880—Mr. Roth says:—

> "At Yengarie Refinery, Maryborough district, the juice is brought from the neighbouring mills partly in punts and partly in pipes, as the greater number of the mills crush the cane only (the juice is limed at the rate of 15 lb. to every 100 gallons of juice). The refinery gives the planters for 1 gallon of juice at a density of 10 deg. Beaume, 1 lb. of sugar; for every degree more or less 10 per cent. is added or deducted."

This was considered to be equal to £21 per ton of sugar in 1879—i.e., for every 2,240 gallons of juice at 10 deg. Beaume delivered at Yengarie the planter received £21. Some of the planters were of the opinion that it paid them better to sell their juice thus; others found they could make the sugar more profitably themselves.

Even as far back as those days there were differences of opinion between those millers who bought cane and the farmers who sold cane, the small settlers complaining that they were badly treated by the mill-owners; but, on the other hand, it was stated that these small settlers belonged to the most prosperous agriculturists of the colony.

It is rather amusing to read in literature published about this time that one of the claims for a sugar-mill called the "Victor"—a small horse-power mill—was that it could be easily shifted and reset, and it was asked by a critic to fancy an Australian humping a sugar-mill about with him like the itinerant sugar manufacturers of India and China.

By 1880 there were fifteen vacuum pans in Queensland, three in the South, four in the Central, seven in the Mackay, and one in the Herbert River districts. At that time the general demand was for a rather medium-sized white-grained sugar and yellow grocery sugars. About two-thirds of the sugar made went into direct consumption and not through the refineries. It was stated that Queensland sugars lacked the brightness and "bloom" of a good Demerara sugar, which was attributed to defective clarification.

[TO BE CONTINUED.]

Bureau of Sugar Experiment Stations.

ENTOMOLOGICAL HINTS TO CANEGROWERS.

By EDMUND JARVIS.

Cane Beetles are Likely to Appear this Month.

The fall of about 9 inches of rain experienced last month (October) has helped to provide more moisture in the upper subsoil than is usually met with during the beginning of November. In the event, therefore, of additional showers being obtained about the middle of this month, greyback beetles are likely to make an earlier emergence from the soil than usual. Since the year 1914, eight annual emergences have occurred in December, five in November, two in October, and one in January.

Make Arrangements for Collecting Cockchafers.

On cane areas known from past experience to be subject to grub attack, growers should start collecting "greybacks" from the foliage of their feeding-trees directly these beetles appear on the wing.

No time should now be lost in locating the position of favourite food plants, such as native figs (*Ficus pilosa, F. glomerata, F. nesophila*, &c., *Eucalyptus tessalaris* ("Moreton Bay Ash"), or others on which these insects have been observed to congregate, chancing to grow close to headlands of their canefields. To facilitate

collecting, clear away all litter or vegetation from the surface of the ground under such trap-trees. Continue the work each day for about five weeks, dating from the beginning of the flighting period.

Make a note of the date of this emergence, as it may prove very useful later on in the event of a farmer wishing to fumigate his soil for cane grubs, as such information would enable him to determine the age of the grubs present, together with the correct time for commencing control work.

Do Not be Without a Spray Pump.

However small the cane farm, no grower can afford to be without the means of fighting such insect pests as "army worms," leaf-eating beetles, or caterpillars, &c. Such invasions are best combated at the right time—viz., when first noticed—as delay of a week or so while sending away for apparatus and chemicals often means material financial loss which might have been avoided. In addition to controlling the ravages of various cane pests, a spray pump often proves useful for treating insects attacking fruit and vegetables, or spraying animals for ticks, &c.

A good bucket pump, which costs under £3, can be recommended as very suitable for applying disinfectants, insecticides, water-paints, limewash, &c., and is designed with a view to being easily fitted to the inside of a small barrel, Kerosene tin, or similar container for holding the solution to be applied. For field work, a knapsack pump will be found very useful when spraying cane leaves attacked by "army worms" or other leaf-eating caterpillars. One having a liquid capacity of about 3½ gallons can be carried conveniently, and only costs about 45s.

When buying a spray pump, see that it is made of brass or copper, and fitted with an effective agitator and large compression cylinder ensuring even distribution.

Remember that all such machines last very much longer if cleaned thoroughly after use, particularly if corrosive liquids have been sprayed.

ENTOMOLOGICAL EXHIBIT AT INNISFAIL SHOW.

An interesting exhibit by the Bureau of Sugar Experiment Stations was taken from Meringa Entomological Station to the Innisfail Show in September. The exhibit comprised showcases depicting the life-histories of all the principal cane pests, charts showing enlargements of the more important ones and their parasites, and spirit specimens of the chief grubs attacking cane. Samples of poisons used in combating grubs were also shown, and a general collection of North Queensland insects, principally of those insects more nearly related to the various pests.

Assisted by a pathological exhibit and one of seedlings from South Johnstone Experiment Station a very comprehensive display was staged, and the farmers attending the show evinced great interest in it, numerous questions concerning the exhibit and cane in general being asked by visitors.

The show committee at Innisfail are to be congratulated on its success, and thanks are due to its members for their assistance in arranging and protecting the Meringa exhibit.

SUGAR LEVIES.

Following is the result of the referendum in connection with the undermentioned sugar levies:—

Defence Fund Levy.

On the making of a levy by the Queensland Cane Growers' Council at the rate of 1d. per ton of sugar-cane harvested during the current season for the purposes of a defence fund—

	Votes.
For	1,997
Against	1,126

Marian Central Sugar-mill Levy.

The making of a levy of 1d. per ton on all suppliers of cane to the Marian Central Sugar Mill during the present season, to be expended only in the interests of defraying the costs of employing a farmers' representative at the Marian Central Sugar Mill—

	Votes.
For	99
Against	75

A bare majority only was necessary on these questions. The proposals were therefore carried.

THE BROWN CUTWORM (*Euxoa radians* Guen.).

By G. A. CURRIE, B.Sc.

PART IV.

CONTROL MEASURES.

THESE may be dealt with under the four headings—

(1) Cultural,

(2) Traps,

(3) Poisons,

(4) Biological.

Cultural.

Considering the four stages in the life history of the insect—egg, larval, pupal, and adult stages—it is considered that the eggs are not likely to be open to control by cultural means; the moths are immune, the caterpillars are subject to a certain degree, and the pupæ are particularly open to control by this method.

Keeping weeds down in fallow lands prevents the breeding-up of larvæ in these areas, while ploughing-in of weeds will eventually prove fatal to most of the larvæ which have been feeding on them. It is not true that all larvæ will perish if their food is ploughed in, for some will finish their growth on the plants in the soil, while others in the sixth instar will succeed in pupating even if not full fed. The fifth instar is, however, incapable of pupation.

Some laboratory experiments were tried to test the length of time the larvæ could exist without food but limitation of material inhibited extensive experiments in this connection. The results are shown in Table VIII.

TABLE VIII.

Larval Resistance to Starvation.

Average Temperature.	Instar of Larva.	Days Starved.	Remarks.
62 deg. Fahr.	V.	22	Died
65 deg. Fahr.	VI.	17	Pupated successfully
70 deg. Fahr.	V.	11	Died
72 deg. Fahr.	V.	12	Died
70 deg. Fahr.	VI.	15	Died
75 deg. Fahr.	VI.	5 + 8*	Pupated successfully

* Starved for 5 days then fed and starved for 8 days more.

Fallow ground with a loose surface covered with weeds is an ideal breeding place for *Euxoa radians*, so fallows should be kept as clean as possible. Sometimes cutworms will breed up in a crop which has been allowed to become weedy, without attacking the crop itself, but living on the weeds. Such weedy crops are a menace as breeding places for the cutworms, which may attack cultivated crops in their next generation.

The fact that cutworms can live for many days without food shows that a weedy fallow in which cutworms are known to be present should not be planted up with a vulnerable crop without an interval of about three weeks elapsing between preparation of the ground and planting.

In extreme cases *Euxoa radians* has been known to act as an army worm over a short distance, that is to say, it has bred up and fed in a certain area until the larvæ have become too numerous for the food supply. They then marched from the area towards some new feeding ground. The destruction of the feeding ground (if weeds) when the larvæ are seen to be numerous may be possible under certain circumstances, or a trap furrow ploughed to arrest the advance.

The form of furrow suitable for checking the advance of *Euxoa radians* should have the following properties:—

(1) Side next to area to be protected should be steep or overhanging.

(2) This side should be crumbly and not moist and caked. A ridge of crumbly earth on top of the steep slope usually thrown up by a swing plough in friable soil will be very effective in checking exit from the furrow.

(3) No roots or pieces of debris should form a bridge from the bottom of the furrow to the top.

(4) If the furrow is perfect and in a friable soil, a depth of 6 inches is sufficient, but 8 inches or 10 inches forms a better protection under ordinary conditions.

To ensure success, trap furrows should be baited with poison bait when the cutworms are seen in them.

The pupa, spending the winter in the soil as it does, is open to destruction by ploughing. Such ploughing should always be done before the end of August if possible so that few will have emerged as moths.

Cultivation between the rows in a field attacked will also destroy some pupæ at any time of the year.

Traps.

There are various forms of light traps and fermenting bait traps used for capturing moths.

The "Andres-maire" trap appears to give considerable success against the moths of *Agrotis ypsilon* Rott. in the Tal lands of Mokamah, India.[13] This success is obtained in an area on which the moths congregate in great numbers at a particular time, and so are particularly open to such means of control.

Fermenting molasses for bait traps has been used with some success in Russia and other countries, against cutworm moths. In Russia open pans of molasses were used with success, but the same method used in America gave negative results. The method, at present somewhat uncertain, may yet prove of considerable value in cutworm moth control. In Queensland[14] traps containing fermenting apple juice and vinegar set out to catch codling moths caught considerable numbers of cutworm moths.

In Queensland the agricultural areas are scattered and much broken up by virgin bush, and so appear altogether unsuited to the use of traps in most places. Although traps may be found to be of local use they were not thought sufficiently promising to experiment with on an extensive scale, as poison baiting for the caterpillars recommends itself to the farmers and is a fairly sure remedy.

Poisons.

Poison baiting for cutworm larvæ has been practised for many years. As poisons, various arsenicals and fluorides have been successfully used. As media for carrying the poison, wheat bran, shorts, horse dung, chopped greens, carrots, and prickly-pear have been used with success.

A prickly-pear bait of some interest has been developed in South Africa.[15] The preparation of this is given as follows:—"To 2 gallons of soft water add 6½ oz. of commercial sodium fluoride (95 per cent. pure), and stir. Chop up an equal volume (2 gallons) of prickly-pear into pieces the size of a thumb. The pieces should be cut clean and not crushed. Add the prickly-pear to the solution and stir. Soak overnight, preferably stirring once or twice during soaking. Drain through a coarse sack or wire mesh, and save the residue, which will keep indefinitely, for house-fly bait."

An advantage of fluoride over arsenical poisons is that fluorides are much less poisonous to stock and human beings. This bait has not been experimented with in Queensland, but the formula is given in case any farmer should wish to try it.

In Queensland wheat bran is readily available everywhere and arsenical poison is usually easy to procure, so experiments with *Euxoa radians* have been confined to testing the best strength of Paris green-bran baits, calcium arsenate-bran baits, and calcium arsenate spraying to control the larvæ.

Poisoning Experiments.

In the first experiment the relative efficacies of Paris green bran baits, and spraying the seedlings of cotton with calcium arsenate were tested.

PLATE IX.

Type of cage used at Cotton Research Station, Biloëla, in experiments to control cutworms by poison baits.

Rows of cotton seedlings about a week old were selected and three cages of the type shown in Plate IX.* were placed over them.

Cage No. 1.—Eighty-three cutworm larvæ put in (fourth, fifth, and sixth instars). Paris green bran bait, 1 lb. Paris green, 24 lb. bran. Moistened with water and sweetened with molasses.

This was freely sprinkled amongst the seedlings.

Cage No. 2.—Eighty-three cutworm larvæ put in (fourth, fifth, and sixth instars). Seedlings sprayed freely with calcium arsenate, 1 lb. powder shaken up in 8 gallons water.

Cage No. 3.—Eighty-three cutworms put in (fourth, fifth, and sixth instars). Seedlings untreated—control.

The following morning the cages were lifted, the cutworms searched for in the soil and removed. A considerable number could not be found because of the area to be worked over and the burrowing habit of the larvæ. Results are given to fifth day; after that the cause of death is uncertain.

Experiment No. 1.—Exposed one night only, afterwards fed on pigweed.

TABLE IX.

Day.	Paris Green Bait. 1lb. to 24lb. Bran.			Calcium Arsenate Spray. 1lb. to 8 galls. Water.			Control.		
	Alive.	Dead.	Total Recovered ex Soil.	Alive.	Dead.	Total Recovered ex Soil.	Alive.	Dead.	Total Recovered ex Soil.
First	41	35	76	65	2	67	69	1	70
Second	26	15	..	53	12	..	65	4	..
Third	19	7	..	41	12	..	62	2	..
Fourth	14	5	..	32	9	..	55	7	..
Fifth	8	5	..	29	3	..	51	4	..
Recovered dead on fifth day—									
Per Cent. ..	89·5			56·7			26·0		

Experiment No. 2.—Repetition of Experiment No. 1, but exposed to baits and poison for three nights instead of one.

TABLE X.

Day.	Paris Green Bait. 1 lb. to 24 lb Bran.			Calcium Arenate Spray. 1 lb. to 8 galls. Water.			Control.		
	Alive.	Dead.	Total Recovered ex Soil.	Alive.	Dead.	Total Recovered ex Soil.	Alive.	Dead.	Total Recovered ex Soil.
Fourth	7	53	60	59	15	74	75	2	77
Fifth	4	3	..	52	6	..	73	1	..
Recovered dead on fifth day—									
Per Cent. ..	93·2			30·0			5·2		

* A type of cage made to the specifications of Mr. L. M. Hodge, manager of the Cotton Research Farm, Biloela.

It will be seen that spraying the leaves of seedlings with poison was not nearly so effective in killing the cutworms as the poison baits, and spraying has the added disadvantage that the leaves are considerably damaged by the caterpillars before the poison stops them.

The following experiment was carried out to determine the effect of different concentrations of Paris green poison in baits. The same cages were used but gauze bottoms were tacked on so that a complete recovery of cutworms after exposure was effected. Loose soil was provided for them to burrow into and pigweed was liberally given.

Experiment No. 3.—Cutworms exposed to poison bait and natural food for one night, then fed pigweed only, for five days.

TABLE XI.

One Hundred Larvæ per Cage.

Day.	Paris Green Bran Bait. (1 lb. P.G. to 32 lb. Bran.)		Paris Green Bran Bait. (1 lb. P.G. to 40 lb. Bran.)		Paris Green Bran Bait. (1 lb. P.G. to 48 lb. Bran.)		Control. (Pigweed and Moist Bran.)	
	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.
First	74	26	89	11	92	8	99	1
Second	34	40	42	47	45	47	94	5
Third	22	12	27	15	28	17	92	2
Fourth	14	8	15	12	15	13	90	2
Fifth	9	5	10	5	13	2	86	4
Dead fifth day— Per Cent.	91·0		90·0		87·0		14·0	

Experiment No. 4.—Paris green bran bait, and calcium arsenate bran bait compared. Cutworms exposed to poison bran baits and pigweed for one night only, then fed pigweed.

TABLE XII.

Sixty Larvæ per Cage.

Day.	Paris Green Bran Bait. (1 lb. P.G. to 16 lb. bran.		Paris Green Bran Bait. (1 lb. P.G. to 24 lb. bran.)		Calcium arsenate bait. (1 lb. C.A. to 16 lb. bran.)		Calcium arsenate bait. (1 lb. C.A. to 24 lb. bran.)		Control. (Pigweed and bran only.)	
	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.
First ..	38	22	40	20	54	6	58	2	59	1
Second ..	25	13	23	17	24	30	47	11	57	2
Third ..	12	13	11	12	10	14	22	25	56	1
Fourth ..	9	3	10	1	4	6	17	5	54	2
Fifth ..	8	1	8	2	2	2	14	3	52	2
Dead fifth day Per Cent. ..	86·7		86·7		96·7		76·7		13·4	

All the foregoing experiments were carried out with larvæ in the later instars, fourth, fifth, and sixth, so a few experiments were tried with small larvæ. A very limited number of larvæ was available for this work, so the number per experiment is small. The experiments had to be carried out in glass jars owing to manipulation difficulties.

Experiment No. 5.—Cutworms in instars I., II., and III., exposed to poison baits and pigweed for one night. Bait was more moistened than that used for big cutworms.

TABLE XIII.—Twenty-three Larvæ per Jar.

Day.	Paris Green Bran Bait (1 lb. P.G. to 24 lb. bran).		Paris Green Bran Bait (1 lb. P.G. to 24 lb. bran).		Paris Green Bran Bait (1 lb. P.G. to 16 lb. bran).		Control. (Fed pigweed and bran.)	
	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.	Alive.	Dead.
First	19	4	19	4	13	10	21	2
Second	11	8	5	14	13	..	21	..
Third	11	..	5	..	8	5	21	..
Fourth	7	4	2	3	1	7	20	1
Fifth	4	3	1	1	..	1	18	2
Dead fifth day—Per Cent.	82·6		95·7		100·0		21·7	

In all cases the natural food of the cutworms (pigweed) was placed in the cages so that they could avoid the poison bait if they preferred. In the case of the controls moistened and sweetened bran was fed as well as pigweed, to check the effect of bran on them apart from the effect of the poison.

It will be seen from the tables that Paris green in strengths from 1 in 16 to 1 in 50 lb. bran is an effective poison for the larvæ of *Euxoa radians*. Calcium arsenate with bran at a strength of 1 in 24 lb. bran is slower in action than Paris green and has a lower percentage kill than any of the strengths of Paris green tried. So it would appear advisable to use the greater concentration 1 in 16 lb. of this poison.

Failure to control the smaller cutworms with calcium arsenate bran mash has been reported.[16]

The experiments (Table XIII.), although not conclusive, owing to the small number of cutworms available, certainly indicate the probability of success with well-moistened Paris green bran mash.

In recommending a bran mash for field use the following points are to be noted:—

(1) Effectiveness as control.
(2) Cheapness and availability of poison.
(3) Safety in handling poison.

Paris green is the most rapidly effective poison tested. Paris green is more poisonous to human beings than calcium or lead arsenates, but its colour strikes a note of warning which serves to draw attention to its presence. It is more expensive than the other two, but can be used in greater dilution.

In mixing a bran mash it is difficult to get an even distribution of the poison when lead and calcium arsenates are used owing to their white colour, which makes them indistinguishable in the mixture. Care and thorough mixing will of course overcome this. The green colour of Paris green contrasting with the colour of the bran quickly draws the attention of the operator to a bad distribution of the poison, and this again recommends it. A bran mash mixed with Paris green will readily be seen to be poisoned if left carelessly about, but this can hardly be said of lead or calcium arsenate.

The addition of molasses to bran mash helps to keep it in a moist, attractive condition longer than if no molasses is used.

A good poison mash would appear to be the following:—

1 lb. Paris green.
1 bushel (28 lb.) bran.
1 quart molasses.
Water to moisten to a crumbly consistency.

If no molasses is available, then salt, sugar, or syrup can be added, or the mash made without any of them. It is attractive to *Euxoa radians* without sweetening. In the case of lead or calcium arsenate being on the premises it can be used as follows:—

1 lb. calcium or lead arsenate.
16 lb. bran.
1 quart molasses (optional).
Water to moisten.

Both these baits are more poisonous than may be strictly necessary, but they are on the strong side to counteract the possibility of inefficient mixing.

In all cases bran baits should be scattered under or near the plants to be protected, and applied in the evening so as to be fresh and attractive during the night when the cutworms come out to feed.

In the field in Queensland, Paris green bran bait and calcium arsenate bran bait (as recommended) have been used with complete success against *Euxoa radians* Guen., *Agrotis ypsilon* Rott., and *Heliothis obsoleta* Fabr.

Quantity of Bait Required in Rows.

In order to test the quantity of poison bait which would effectively cover the ground in the rows under the plants to be protected, experiments were carried out with moistened bran.

For plants in rows, the weight of bran necessary to sprinkle along a chain was tried, and from this figure the amount of bran necessary to protect an acre can be obtained for all different widths between the rows. In the case of cotton in Queensland, the usual width is 4 feet 6 inches, so the figures for that distance will be given.

The bait has to be distributed as thinly and evenly as possible so that the cutworms when coming out to feed at night will encounter poisoned bait readily. This is the theory on which the quantity was worked out.

It is necessary to state here that cutworms were controlled in an experimental plot of cotton at Gatton Agricultural High School and College in 1924 by placing out Paris green bran bait in lumps, the size of a walnut, at intervals of about 6 feet. The cutworms were all large ones, and they seemed to be attacted to the bait in preference to their other food.

For large areas in the field, however, most rapid distribution is obtained by scattering along the rows, and on that method is based the calculation of the quantities shown below:—

Weight of dry bran per chain, thinly distributed, 22 oz. for 12 chains =1·83 oz. per chain = 145 × 1·83 oz. per acre in 4 feet 6 inches rows = 16½ lb. dry weight bran per acre.

Weight of dry bran per chain, heavily distributed—

12 chains required 48 oz. bran
1 chain required 4 oz. bran
145 chains required 580 oz. bran
= 36 lb. per acre in 4 feet 6 inches rows.

An actual field test over 20 acres required an average of 25 lb. per acre for an even cover along the rows of cotton seedlings in 4 feet 6 inches rows. This is about half-way between the heavy and light distributions tabulated, so it is probably a safe figure to keep in mind when mixing up bait in quantity.

Amount of Bait Required in Broadcasting.

This will vary with the seriousness of the attack. If caterpillars are large, and present in enormous numbers, a fairly heavy dressing is safer than a lighter one, and vice versa.

Tests by sprinkling measured areas gave the following results:—

	Lb. per acre dry weight of bran.
Very heavy broadcast dressing	220
Heavy broadcast dressing	180
Medium broadcast dressing	100
Light broadcast dressing	50
Very light broadcast dressing	30

As in all cases of insect control, the economic problems of cost of application, against gain by the protection offered, must be worked out in each individual case, by the person interested.

Biological.

The possibility of this form of control being used in the case of *Euxoa radians* has not been seriously considered. The pest is of sporadic occurrence, so that already it is controlled save when exceptional circumstances allow it to become of economic importance. It is indigenous and has numbers of native parasites operating against it, so that it does not appear to offer a good subject for biological control methods.

Entomophagous fungi have been used in other parts of the world to attempt control of cutworms, but so far little hope is held out of that method being a successful one.

Its habits protect it from natural enemies while at the same time placing it at the mercy of soil conditions. In poison baits there is a very good local form of control which is usually cheap enough in application to warrant its use.

[TO BE CONTINUED.]

"A WEALTH OF INFORMATION."

A Home Hill farmer writes (4th October, 1930):—" . . . . From the pages of the Journal a wealth of information is to be gleaned by the man on the land. I always look forward to its arrival. . . ."

DISEASES OF THE PIG.*

E. J. SHELTON, H.D.A., Senior Instructor in Pig Raising.

[*Continued from the September issue.*]

PART II.

In the preparation of information dealing with Diseases of the Pig, an endeavour has been made to describe in the simplest language possible the various conditions, abnormal and otherwise, associated with the incidence or appearance of disease in swine. The suggested preventive measures and methods of treatment are such as may be successfully carried out by any careful farmer, excepting only in cases where the services of a qualified veterinarian are advised, and in these cases the best methods to follow will be suggested on the spot by the surgeon himself.

The pig is notoriously a bad patient and a difficult animal to handle when indisposed, hence great stress has been laid throughout this treatise on the necessity of preventive measures, for prevention is not only much better than cure, but is invariably less costly and a great deal more satisfactory.

In dealing with methods of treatment and the engagement of qualified aid, it has been realised there are numerous difficulties in the way, because Departmental officers or practising veterinarians are not always immediately available in town or country districts. Again, therefore, we stress that prevention is better than cure, and we might even qualify this further by adding prevention is more necessary than cure.

Mr. Shelton's bulletin, representing as it does much labour and the fruits of careful study and observation, is a welcome contribution to current pig literature.—EDITOR.

DISEASES AND PARASITES OF THE SKIN.

PIGS suffer from several skin diseases (and from infestation by a number of external parasites), all more or less serious in their nature and effect, and all likely to spread through a herd if the animals are neglected. Skin diseases and parasites cause considerable economic loss in the course of the year, both in checking the animal's growth and in affecting the appearance of the carcass, for as is well known the skin is not removed from the carcass (as it is in sheep and cattle) during the process of slaughtering and dressing.

* The typescript and illustrations of the Farmers' Bulletin on Diseases of the Pig have been submitted to the Chief Inspector of Stock, Major A. H. Cory, M.R.C.V.S., Department of Agriculture and Stock, Brisbane, Queensland.

Copies of the Bulletin may be had gratis on application to the Under Secretary, Department of Agriculture and Stock, Brisbane, Queensland.

In the compilation of this paper the writings of recognised authorities in other States and other parts of the world have been drawn on, and the assistance thus received, also that freely given by other Departmental officers, is acknowledged gratefully.

Diseases and parasitic affections of special interest to pig breeders are—

Sunburn or Sunscald,
Urticaria or Nettlerash,
Pigmentation,
Pruritis or Itching of the Skin,
Dermatitis,
Eczema,
Hog Lice, Fleas, Flies, Mosquitoes, Scrub Ticks,
Demodectic or Sarcoptic Mange,
Open Wounds, and occasionally Snakebite.

DEEP SEATED PARASITES.

The parasites that burrow into the skin cause intense irritation and result in rapid loss of condition, and in some instances in an anaemia of the body. The skin is also damaged as a result of the animal rubbing against fence-posts and tree-stumps, and the commercial value of the carcass is reduced even though it may not be condemned as unfit for use; in such a condition the carcass lacks its characteristic colour and presents an unsightly appearance. In some cases the flesh is quite healthy and normal if the skin is removed, but the value of that particular carcass is reduced.

It is difficult for farmers to differentiate between the various skin diseases of the pig, for, in many respects, they resemble one another. Nettlerash, or mange, for instance, are deep seated troubles, whereas sunburn and sunscald are surface complaints, yet both cause severe reddening and soreness of the skin.

Effect of Disease.

The skin of the pig in health is very sensitive, both to internal and external influences. In disease, it may be discoloured, blotched, scarred, or disfigured in patches of varying size and shape, or it may be roughened and painful, yet not actually damaged. Such abnormal conditions may result from parasites, injuries, sunburn, or from accumulations of filth and mud. Internally, abnormal conditions may result from the improper use of certain foods; simple discoloration of the skin is seen even in slight digestive derangements and fevers, but these usually are not serious and yield to the administration of a brisk purgative, to suitable dieting, and to the discontinuance of the foods responsible for the trouble.

Dirt, lice, and mange mites produce an inflammation of the skin which is sometimes referred to as dermatitis. The latter differs from eczema in not passing through definite stages such as are common in that disease and by being produced principally by external causes. Lice, owing to their relatively large size, may readily be seen by the naked eye; mange mites, of which two varieties affect the pig, are minute and require the use of the magnifying glass in their discovery, and much more energetic and protracted treatment for their destruction. Pigs are occasionally affected with a non-parasitic skin disease referred to as sucking-pig rust, sooty or pitchy mange, a condition arising from dirty sties, accumulations of mud, and decomposition of the sebaceous matter of the skin—a trouble also exaggerated by internal ailments. Internal parasites also cause an unthrifty condition of the skin, and may be responsible for all the above skin troubles.

PLATE 135.

Fig. I.—Hog Louse × 10 (*Hæmatopinus suis*, Lin.).
Fig. II.—Scrub Tick × 10 (*Ixode holocylus*).

Pigs whose growth is checked by abnormal conditions (prenatal and otherwise) are usually styled "runts." It usually pays better to destroy the runts and to devote the time, attention, and food to more thrifty stock.

Meat inspectors often come across the carcasses of pigs in which the skin is blotched, freckled, or stained to such an extent as to cause the carcass to be graded as second or third class, or even unmarketable. These cases are usually classed as due to pigmentation. It is difficult to account for them, and in many instances actual cause is unknown; deep seated pigmentation in the region of the udders producing the condition known as "seedy cut" is responsible for economic losses in the bacon trade, particularly in the keener competition overseas.

Improper food may cause the carcass to be yellowish or pinkish, or to have a distinct fishy taint. Carcasses may also be soft and fail to set in cases where excess of oil is present in the food. Such carcasses are quite unsuitable for bacon, and are often of no value in the preparation of small goods. In the trade they are often referred to as "peanut-fed" pigs, though peanuts are not the only foods responsible.

ECZEMA.

True eczema is non-contagious and is an uncommon skin disease of the pig, the true form of which manifests itself by an eruption consisting of tiny reddened pimples, which later develop into blisters and pustules, which dry off and result in scab formation. These pimples may remain separated from one another or may run together and form large weeping sores which contain matter or pus, and may be the medium by which a septic condition of the skin may spread from one animal to another, as, in their endeavour to relieve irritation, the affected animals rub against fence-posts, rails, troughs, and trees.

Treatment.

For the relief of eczema, both internal and external medication is required. Commence the treatment by giving a brisk purge, followed by medicines that eliminate the waste products and toxins of the body, by way of the kidneys and the intestines.

Cleanse the skin with soap and warm water, and when dry rub in lightly a dressing of coconut or salad oil. Follow this by dressing the skin daily with 1 per cent. solution of picric acid, or with a mixture prepared as follows:—

Salicylic acid	2 drachms
Oxide of zinc	3 drachms
Coconut oil	8 ounces

Mix well and apply night and morning. Internally, medicines prepared as follows may be used:—

Recipe No. 1.—Bicarbonate of potash, 1 part; black antimony, 1 part; nitre, 1 part; sulphur, 3 parts; liquorice powder, 4 parts; fenugreek, 12 parts. The dose is from one to four teaspoonsful mixed with the food daily.

Recipe No. 2.—Another useful medicine which the local chemist would make up has its chief components: Potassium nitrate, ½ to 1 drachm; sodium bicarbonate, 1 to 2 drachms. Give as directed in food.

DEMODECTIC MANGE.

Demodectic mange is highly contagious, and is caused by a minute parasite called *Demodex folliculorum* var. *suis*. It differs from eczema in that it is caused by a parasite, wheras eczema is purely a constitutional trouble. It first shows in the form of blisters which later contain pus. The disease is most frequent in young, weakly, or sickly animals, and generally spreads over the whole body. It is exaggerated by dirty sties, accumulations of mud, and decomposition of the fatty secretions of the skin.

Treatment consists of washing the affected animal frequently with warm water and soft soap. The pigs must be kept under hygienic conditions and be given plenty of nourishing food. In very severe cases affected animals should be slaughtered without delay.

It is well to remember that mange parasites are not usually troublesome, except in cases where the animals are neglected and improperly nourished.

It must also be kept in mind that no treatment will prove efficient unless the buildings in which the stock are kept or housed are also thoroughly disinfected. The buildings should be sprayed with a solution of carbolic acid, 1 part to 300 parts of water, taking care to force the spray well into the crevices where the mange mites accumulate. The pig yards and paddocks should be thoroughly cleaned up; rubbish, corn cores, waste timber, bones, and other accumulations raked up and burnt, and the yards dug over and limed. If it can be arranged for, the pig paddocks should be ploughed and some green crop grown thereon for a season or two. Grass paddocks should be burned off and be put under cultivation before being brought into regular use again.

SARCOPTIC MANGE.

Another troublesome skin parasite, *Sarcoptic scabiei* var. *suis*, is responsible for the condition known as sarcoptic mange. Here again microscopic examination of the scurf would be necessary. The disease is first seen affecting the head, especially in the hollows of the eyes, on the eyelids, and around the ears, then over the neck, back, and inner sides of the thighs, and finally over the whole body. Early in the attack the disease will be noticed as roughened patches covered with bran-like scales, blisters, and pustules. Later these pustules develop into extensive whitish grey scabs. The skin becomes thickened,

PLATE 136.—EXTERNAL PARASITES IN SWINE.
Sarcoptic scab in the pig.

wrinkled, and very tough. The bristles are loosened and fall out—sometimes they become attached and fall out in bunches or tufts. Beneath these roughened patches will be found the tiny microscopic mites responsible for the trouble. The disease is not prevalent in Australia as far as departmental records show.

Treatment.

Preventive measures are emphasised. There are several forms of treatment, and several mixtures well worth applying early in the attack. First, aim at softening and removing the scabs with warm water and soft soap. It may be necessary to give the animal several washings before the desired results are obtained. Meanwhile the pigs should be kept in a dry sty, supplied with short straw or other clean dust-free bedding. The following lotion should be applied to the skin as soon as the scabs are softened and ready for removal:—Flowers of sulphur, 3 oz.; potassium carbonate, 1 oz.; neatsfoot oil, 1 pint; mixed together while the oil is warmed slightly. Pigs should be well washed before applying the mixture.

Mange, when present in a piggery, is liable to cause considerable economic loss, for the animals, in endeavouring to obtain relief from the intense irritation, rub themselves against all sorts of roughened objects, damaging the shoulders, sides, and hams more than the belly or feet. The loss is greater than if the head, ears, or neck were the principal or only portions affected.

This damage to the carcass by roughened skin and inflammation sometimes causes the meat to be rejected as unmarketable. In other instances the injuries place the products from such pigs in a grade which has a reduced market value of from 2d. to 3d. per lb.

Treatment for sucking-pig rust or pitchy mange referred to herein consists in cleanliness, correct methods of feeding, and frequent washing of the skin with soft soap and warm water, followed by application of oil or antiseptic ointment. The following mixture is recommended:—

Raw linseed oil	1 quart
Hycol disinfectant	1 teaspoonful
Flowers of sulphur	4 ounces

Mix the flowers of sulphur with a small quantity of the oil first, then add the balance of the oil, and finally add the Hycol disinfectant, stirring the latter well into the mixture before applying to the skin. Repeat the application for several days, and keep affected animals isolated from healthy stock and under improved hygienic conditions, feeding liberally on soft, nourishing foods, allowing ample supplies of clean drinking water, greenstuff, and mineral matters.

URTICARIA OR NETTLERASH.

This disease is of dietetic or systemic origin, and causes intense irritation and inflammation of the skin. It is usually noticed in very young pigs, and is frequently associated with disorders of the digestive system (indigestion, feverishness, diarrhœa). In its efforts to obtain relief the affected animal rubs itself vigorously against fence-posts, rails, and the pen walls, and is likely to seriously injure the skin, which then becomes more readily affected by mange, sunburn, and parasites.

Nettlerash of dietetic origin is often due to over-feeding on highly concentrated foods. Such disorders must be treated by regulation of diet and the provision of succulent green foods and ample clean drinking water. In many cases there are constitutional disturbances which lead to general ill-health.

Treatment.

In addition to change of diet, strict attention must be paid to cleanliness and to the general health and wellbeing of the animals. Frequent doses of Epsom salts, light nourishing food, and plenty of clean drinking water are advised. Softening the skin and hair by regular application of cocoanut oil or antiseptic ointments will assist considerably in effecting relief.

BLOW FLY WORRY.

The ordinary blow fly, usually referred to as the sheep blow fly, is a source of considerable annoyance to live stock. The damage and irritation resultant from infestation by the larvæ (maggots) of this fly is of considerable economic importance, though, as far as the pig raiser is concerned, the loss of his revenue should be reduced to nil, provided the stock are carefully handled and efficiently controlled.

In the pig, infestation by maggots follows the attach of the fly upon wounds resultant from castration or other operations or from accidental causes. The fly deposits the living larvæ upon the wounds and they set up irritation and pus formation. Unless the animal is given immediate attention this irritation may result in serious complications.

Treatment is largely preventive or such as would prove successful in dealing with wounds of any description.

[TO BE CONTINUED.]

RAKING A LAWN.

It is difficult to rake up leaves, grass, and hedge clippings from a lawn, especially when it is composed of baffalo grass. The contrivance illustrated will prevent the teeth of the rake catching in the grass. Two cotton-reels are placed one on each

end tooth of the rake, and wedged there so that the bottom end of each reel is a little below the line of the teeth. The rake then rides easily over the grass, and collects the rubbish.

FARMERS' SHEEP AND WOOL.

By J. CAREW, Senior Instructor in Sheep and Wool.

PART II.

This is the second article of a series planned for the purpose of supplying some of the information sought from time to time by readers interested in sheep and wool; and also with the hope of stimulating interest in sheep raising on comparatively small holdings.

BREEDS OF SHEEP.

BREEDS of sheep already known in Queensland may be classified in four groups, viz.:—The Merino; English Longwools; English Shortwools or Downs breeds; and the Intermediate or Corriedale.

The Merino.

The merino is by far the most important breed of sheep in Queensland. After experimenting with stock-breeding in the early days of settlement in Australia, Captain John Macarthur concluded that sheep would thrive better in this country than any other animal, and this belief has since been confirmed by experience and results.

His small foundation flock was composed of Spanish merinos brought in from Cape Colony and was improved by later importations from England, followed from time to time by different merino types (notably the Saxony and Negretti), but the real improvement was secured after the occupation of what proved to be natural sheep country west of the Great Dividing Range. The big-framed Rambouillet was subsequently introduced and this infusion, aided by science, good flock management, and change of environment, produced a long-stapled, bulky class of wool on a large-framed, strongly constituted type of sheep. In further development, a purely Australian breed was evolved containing three distinct types, viz.—fine, medium, and strong.

Each of these groups possesses its own peculiarities, and two are adapted especially to Queensland conditions—namely, the medium and strong types. Of these, the medium forms the greater proportion and ranges over a vast extent of our pastoral territory. In the far West where conditions are exacting and animals of the hardiest constitutions are required, the strong type is favoured.

The wool of the merino is short, of fine quality, even, regular in length, of distinct character and showing a well-defined crimp according to type. In colour it is bright white, fairly well-charged with yolk which, in heavy condition, may show up as light brown. The breed is slow in maturing, but when bred and reared under congenial conditions retains its vitality to an old age.

The Longwools.

The Lincoln (Plate 139), like the Romney Marsh, was originally a Marsh breed, and, although it is now surpassed by the Romney in its ability to withstand wet conditions on low lands, it is generally considered to be hardier than either of the Leicester breeds. They cross well with the merino, and the half-bred ewes from this cross, when mated back to the merino, produce a greatly-favoured breeder for the fat-lamb trade. The Lincoln half-bred, and to a greater extent the quarter-bred, is also valuable, as a wool-producer, giving a fairly weighty fleece of good length and colour, improving in quality with the influence of the merino.

PLATE 137.—A GOOD TYPE OF AUSTRALIAN MERINO RAM.

PLATE 138.—MERINO EWES.

PLATE 139.—LINCOLN RAM.

PLATE 140.—LINCOLN-MERINO CROSS.

This breed has been most favoured since its descendants in countries other than England have proved of such value in crossing for both wool production and mutton. (Plate 140.) A peculiar fact is that the half-bred Lincoln merino matures earlier and fattens quicker and easier than either of its parents.

The English Leicester (Plate 141) is another of the longwool breeds. It is an outstanding example of what can be achieved in breeding by selection.

Robert Bakewell's name stands out prominently in connection with the improvement of the Leicester in transforming it, in a few years, from a raw-boned, lanky sheep to a model of symmetry that developed quicker, and put on flesh on the most valuable parts, with a minimum amount of bone. The new Leicester was best suited to favourable conditions, and stood badly with other breeds on scanty pastures. They are not so prolific as other breeds. These defects, together with delicacy of constitution and poor milk secretion, stand against the breed to this day. They cross well with almost any breed, particularly with the merino, but more favourable conditions are necessary than for other longwool breeds. The Leicester produces a lustrous wool about 8 to 9 inches long, with a spinning quality of about 40s. The fleece weight varies from 12 to 20 lb.

The Border Leicester (Plate 142) is also a longwool breed, though the wool is not so long as that of the English Leicester, but finer in quality, and lighter in fleece weight.

This breed is really the result of a cross between the English Leicester and the Cheviot. The former was selected for its flesh production and the latter for its ability to withstand hardship, the idea being to raise a special dual-purpose sheep. The results have been a good illustration of what can be accomplished by mating suitable breeds and making the right selections. Their forequarters are full and well formed, their ribs well sprung, showing a straight square back noted more for width than depth, which gives them a high standing appearance. This with their white well-carried head, commands attention.

Considering its large frame it matures very quickly and when crossed with the merino transmits the same quality to the offspring. (Plate 143.) The half-bred ewe makes a good mother, and is specially suited to mixed farming conditions, but is more partial to higher and sweeter country than either the half-bred Lincoln or the Romney Marsh, while as breeders they do not retain their stamina for the same length of time.

These half-breeds are suitable both for the fat lamb trade and mutton. The wool they produce is of a useful type, being about 56s., in spinning counts, usually showing plenty character, and of a good colour.

The Romney Marsh (Plate 144), although a longwool breed, cannot be regarded as up to the standard of the other breeds named as wool-producers, the wool being duller in colour, shorter and showing less character. They are more of a natural grass sheep than any of the longwools; their chief feature being a strong constitution, hardiness under wet trying conditions, and their adaptability to low-lying situations. In the North Island of New Zealand the Romney has become very prominent where formerly it was thought impossible to establish sheep breeding owing to the moist conditions, and it is owing to its influence that the export lamb trade in the North Island has become so firmly established. They cross well with the merino; the half-bred ewe can be regarded as a most useful farmer's sheep. (Plate 145.)

Other longwool breeds could be quoted, but there are no conditions in Queensland which could be met by any of these breeds better, or as well as, the breeds referred to. On account of the weight of fleece that these Longwools and their crosses produce, they are more profitable to keep as breeders for farmer's flocks than the Downs breeds or their crosses. When finished with as breeders there is a

PLATE 141.—THE ENGLISH LEICESTER.

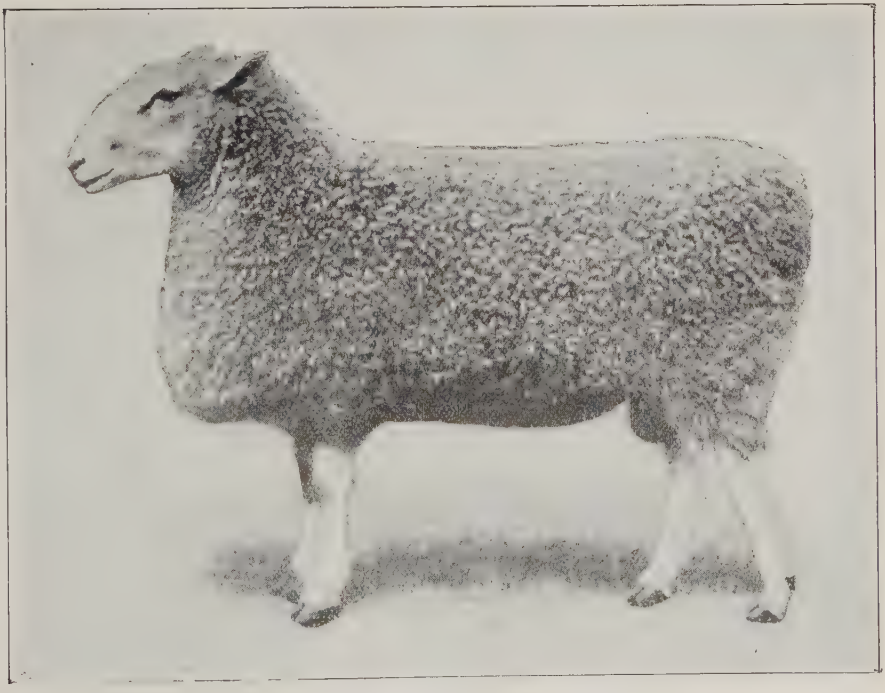


PLATE 142.—THE BORDER LEICESTER.

PLATE 143.—BORDER LEICESTER-MERINO CROSS.

PLATE 144.—THE ROMNEY MARSH.

large carcass left for the butcher. All these points must be considered when undertaking sheep-breeding on small holdings, although the Downs breeds possess many good qualities. They are purely mutton sheep and quick maturers as lambs. As breeding ewes, however, have to be retained on holdings from year to year, the most profitable type should get preference, especially if they possess all other suitable characteristics. In breeding for the fat lamb trade, the Downs breeds are worthy of consideration.

The Downs Breeds.

The Southdown (Plate 146) is the oldest of the British Downs breeds, and has been regarded in England as producing the primest mutton. The body is uniform, broad, compact, having evenly-balanced joints, with flesh and fat evenly distributed. The lambs grow quickly and fatten easily. For our purpose they do not show sufficient merit to compensate for their lack in the production of wool. They may be used to advantage in mating with crossbred ewes for getting early-maturing lambs, but other breeds have been tried out in comparison with them and have proved more satisfactory in this respect. This with its low annual return for wool does not tend to increase its popularity as a farmers' sheep in Queensland.

The Shropshire is another of the dark-faced Downs breed. It is darker in the face and points and not so symmetrical in shape as the Southdown, but rather hardier and thrives better on a variety of pastures. In most respects, however, it is similar to the Southdown.

There are several other Downs breeds available as mutton breeds, including the Dorset Horn (Plate 147), which has proved itself one of the most suitable as a sheep giving a greater body weight and one of the earliest to mature, as also is its progeny when crossed with crossbred ewes. (Plate 148.) This is not only the result of experiments in Queensland, but also in New South Wales and South Australia.

The best results have been achieved when mating the pure Downs breeds with half-bred ewes. In following this system of mating the whole of the progeny can be disposed of as soon as fit.

The Corriedale.

Another sheep which has developed into great favour is the Corriedale. (Plate 149.) This breed was raised by crossing the Lincoln with the merino, and is now regarded as a type midway between the two breeds.

The evolution of this breed filled a vacancy in breeds required as dual-purpose sheep for farming conditions. Continually cross breeding for a given purpose does not give us anything permanently suited for the purpose, so that the Corriedale not only supplies us with sheep well fitted for farming purposes, but it gives us a lead in evolving other types, which may be necessary for other special purposes.

The Corriedale develops into a good, strong, large-framed, robust sheep which carries a fleece weight ranging from 10 to 12 lb. with spinning counts ranging from 54s. to 56s. and higher.

The breed is remarkable for the evenness of length and quality of the wool they produce. The staple should be long according to quality, bulky, full and even to the tip, showing a pronounced wave or crimp throughout. The lambs are not such quick-maturers as some of the crossbreds referred to previously, but this could not be expected when their wool-producing capacity is considered.

As a breed where wool and mutton are the chief considerations they stand out on their own as farmers' sheep in the Plateau area. The ewes (Plate 150) make ideal breeders for farmers' flocks, and are suitable as mothers for the fat lamb trade when mated with either the Border Leicester or Dorset Horn ram.

PLATE 145.—ROMNEY MARSH-MERINO CROSS.

PLATE 146.—THE SOUTHDOWN.

PLATE 147.—THE DORSET HORN.

PLATE 148.—DORSET HORN-CROSSBRED CROSS.

PLATE 149.—THE CORRIEDALE.

PLATE 150.—A CORRIEDALE EWE.

RECLAIMING PRICKLY-PEAR LAND.

PASTURE EXPERIMENTS AT PALARDO.

By H. C. QUODLING, Director of Agriculture.

The remarkable success of efforts to combat the prickly-pear by biological control methods, mainly by means of the moth Cactoblastis cactorum, the caterpillars of which feed voraciously on this plant, has created interest in the question as to how land reclaimed from the pest may be brought into economic production. Accordingly a series of experiments were begun last October on a 70-acre section of belah and brigalow country near Palardo, in the Maranoa district. Various grasses and fodder plants were sown. For the greater portion of the experimental term exceptionally favourable seasonal conditions prevailed. By May every kind of plant grown had made sufficiently good progress to warrant light stocking with sheep of the area sown. Extraordinarily prolific growth followed the heavy rains of late autumn, and much heavier stocking of both cattle and sheep would have been possible. It may therefore be assumed with some justification that, after the destruction of the timber by "frilling" and poisoning (sufficient shelter belts and groves, of course, being retained), and the sowing of suitable grasses and fodders, this land may, without an unduly heavy outlay, be brought readily into profitable use.

The practical application of this system to extensive tracts of pear country now in process of being freed from the pest should have a far-reaching effect on production, particularly in relation to animal husbandry. —ED.

TO date nothing in the history of settlement in the "pear belt" of Queensland is thought to be of greater importance than the work of the Cactoblastis insect in freeing country of the pest, which at its peak period overshadowed something like 50,000,000 acres of land. The necessity was realised of following up the progressive work of the insects, which have been widely distributed by the Prickly-pear Land Commission, and of finding a means of promptly bringing the immense areas of brigalow and belah "scrub" lands into a state of productivity. With this object in view, and setting aside for the time being the forest country (where grass and herbage soon show up after ringbarking) experiments were initiated last October at Palardo, on the Western line, where the use of a 70-acre section of country was secured from Messrs. Henderson Bros. Here, as in other places, successive waves of Cactoblastis had literally flattened out the pear and reduced it to a mass of rotted and partially rotted vegetable matter, right in amongst a thick stand of trees, numbering between 200 and 400 per acre, mostly about 8 to 10 inches in diameter, with odd trees, in the case of the belah, up to 20 inches at the butt.

Other objectives aimed at in designing the experiments were:—

(*a*) To try and derive the fullest possible benefit from the large quantity of vegetable matter present.

(*b*) To avoid the immediate use of fire so as to ensure the preservation of the humus; and the various forms of insect life which had wrought the destruction of the pear in the first place, so that successive generations of insects might more effectually deal with all the following growth of pear, and, incidentally, to obviate the inevitable suckering, which takes place if brigalow is prematurely fired.

(*c*) To "frill" and poison the standing timber with arsenic pentoxide to ensure a more rapid and decisive "kill."

(*d*) To broadcast summer-growing and winter-growing grass mixtures and cover crops to permit of stocking the country as quickly as possible and making it productive in a matter of months rather than years; and in doing so, to bring about an appreciable increase in its carrying capacity.

(*e*) To ascertain the most suitable and effective strength of arsenic pentoxide solution for timber destruction; and for killing "suckers."

(*f*) To determine the best period of the year to destroy the timber, so that any suckering of the brigalow would be avoided.

PLATE 151.—AN OUTPOST OF EMPIRE. THE PIONEER SURVEYS A NEW REALM.

Typical Brigalow and Belah "Scrub" Country Interspaced with Box and Sandalwood Forest (overlooking Site of Experiment Plots).

PLATE 152.—"PEAR" GROWING ON EXPERIMENTAL PLOT SITE BEFORE THE INTRODUCTION OF COCHINEAL AND CACTOBLASTIS.

SUMMER SERIES.

In the summer series, Rhodes was chosen as the principal grass (8 lb. per acre), a small quantity (1 lb. per acre) of *Paspalum dilatatum* being added. Individual cover crops on the respective 3-acre sectional areas being Sudan grass (8 lb. per acre), White Panicum (20 lb. per acre), Japanese Millet (20 lb. per acre), French Millet (14 lb. per acre), and Giant Panicum, setaria (20 lb. per acre).

Method.

As it was out of season for timber destruction work, October to December (the usual period being from late February to July), a strong solution (30 per cent.) of arsenic pentoxide was used and applied immediately after "frilling," a fall of 2.57 inches of rain having induced a perceptible sap movement.

Seed was broadcasted by hand in the first week in December right on top of the rotting pear. At this time a few of the trees were still alive, but most were dead or dying. Sixty-five points of rain fell in November. A heavy storm, yielding 318 points, fell the first week in December. The resultant moisture induced a good germination of seed, but did not penetrate more than 3 inches of the pear mulch, the soil being still dry. In January 229 points were recorded. February was a dry, hot month, only 93 points being registered. Approximately 60 to 70 per cent. of the cover crops and young grass seedlings perished about the end of the month for want of moisture. The remainder, which had the benefit of a slight run-off from the pear, carried on until the March rains. At this period all the cover crops bore seed, which fell and germinated, only to be checked by frost in May and June. By this time Rhodes grass was well established, but the stand requires to be thickened up by natural and artificial reseeding.

Conclusions to date show that the factors which adversely affected the progress of this series of experiments were the lack of moisture in the soil and subsoil (which did not get a good soaking until May), accentuated by the heat wave in February at a time when an appreciable number of trees were not quite dead, contributory to which was the all too short a period between the time of "frilling" and poisoning the scrub trees and that of sowing the seed.

WINTER SERIES.

In this set of experiments there were six plots, each 3 acres in area.

The conditions in respect to the pear itself were practically the same as for the summer series, viz.:—The rotted and partly rotted mass ranged from 3 to 5 inches in thickness, with numerous clumps of old, dry, fibrous pear about 12 inches in height, rotting at the base, but which had not yet completely broken down and flattened out. Throughout some small patches of soil were to be noted where no pear had grown, these being found more in the belah, and were either lightly covered with short moss or with thin tufts of grass, *Panicum gracile* principally; a little creeping saltbush and roley-poley (*Anasacantha*) were also showing up at intervals.

The period of frilling and poisoning the trees, October to December last year, was practically the same as for the summer series. A few trees still showed signs of life on 10th February this year, when the seed was sown, but by 20th March, the date it germinated, the trees were to all intents and purposes dead.

Seed Mixture.

To provide for a well-balanced ration, a standard mixture was made up for this particular experiment, subsequent to testing the germinating quality of the seed, comprising—Prairie grass (10 lb. per acre), Lucerne (3 lb. per acre), Bokhara clover (2 lb. per acre), Rhodes grass (2 lb. per acre), Sheep's burnet (1 lb. per acre), and *Phalaris bulbosa*, Toowoomba canary grass (¼ lb. per acre). This mixture was sown with different cover crops for each plot, these latter being Currawa wheat (30 lb. per acre), Cape and Skinless barley (15 lb. each per acre), Algerian and Sunrise oats (15 lb. each per acre), Rye (30 lb. per acre), Canary seed (10 lb. per acre), and Dwarf Essex rape (7 lb. per acre) respectively.

Germination of Seed and Plant Development.

The seed lay on the surface at the mercy of birds and animals for a little over a month, an exceptionally good germination taking place on 20th March after the rain had carried the seed on to the rather loose but moist vegetable matter present in the interstices of the dried-out pear residues.

PLATE 153.—THE EFFECTIVE WORK OF THE CACTOBLASTIS ON EXPERIMENT PLOT SITE.

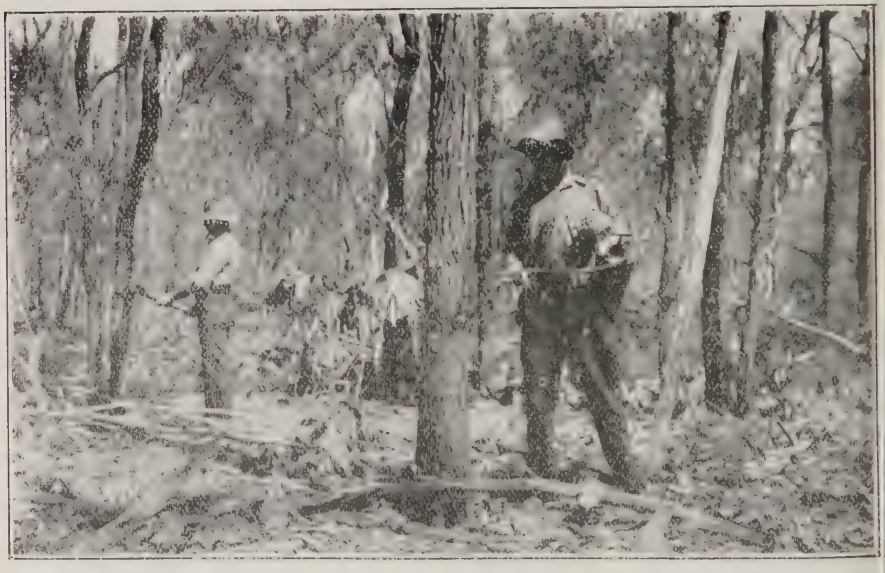


PLATE 154.—"FRILLING" AND POISONING TIMBER WITH ARSENIC PENTOXIDE.
Cost 7s. 6d. per annum plus 1s. 6d. per annum for 6 lb. of poison.

Aided by an excellent season the growth was extraordinary, the taprooted plants —Lucerne, Bokhart clover, and Sheep's burnet—striking down through the decaying pear deeply into the soil, whilst all surface rooters revelled in the rich decaying vegetable matter.

Within three months there was an abundance of succulent fodder and grass in fit condition to carry stock. The lucerne and prairie by this time were 12 inches long, the cover crops being stronger and more luxuriant.

So far no stocking has been undertaken in connection with this particular series as it was necessary to allow the cover crops and grasses to mature sufficiently to permit of the yields being assessed, and to determine also whether certain of the plants would bear viable seed. The yield on the two most forward plots, where cover crops of rape and barley were grown, was taken on 9th July. The former gave a return of 14 tons of fodder to the acre and the latter 10 tons. The rainfall from January to June was as follows, the number of wet days being shown in parentheses: —January 2.29 (6), February .93 (3), March 1.89 (4), April 1.62 (3), May 5.29 (4), June 2.88 (7).

Conclusions.

The season undoubtedly was an exceptionally favourable one and much superior to the average run of seasons experienced in the district. Conditions were fairly normal prior to the heavy fall of rain in May. Observations then made showed that every kind of plant was making sufficiently good progress to warrant light stocking with sheep if it were necessary to do so. Aided, however, by the excellent rains in May, the resultant plant growth and development was extraordinary, which would have permitted fairly heavy stocking by cattle or sheep if such were expedient.

Up to the present there is some justification to assume that the frilling and poisoning of the "scrub" trees and the sowing subsequently of suitable grasses and fodders apparently offer an efficient method of dealing with this class of country. Its practical application to the extensive tracts of pear country now in process of clearing by biological means should have a far-reaching effect on production, which at a not too far distant date might be expected to find expression in the way of increases in the amount of beef, mutton and lamb, wool, dairy produce, and pork in direct proportion to the character of the development work undertaken and the kind and amount of food provided for the various kinds of stock.

PROGRESS REPORT, 1st JULY TO 30th SEPTEMBER, 1930.

Rainfall—Month.	Number of Wet Days.	Points.
July	3	91
August	4	141
September	5	87

Summer Series, 1929-30—(16 acres), comprising one 4-acre and three only 3-acre areas.

Reference was made in the June progress report to the fact that although a good germination occurred both of grass and cover crop seeds sown during the first week of December approximately 70 per cent. of the young plants died owing to the heat wave in February. Observation showed later that the time between the killing of the timber and that of sowing the seed (five to six weeks) was too short, as the subsoil had not been wet for several months and did not fully benefit in this respect until the following May. The cover crops, although they made fair growth, were patchy. The Rhodes grass was also irregular; it, however, made excellent progress, and except for slight tip frosting kept green and succulent right through the winter, the standing timber affording a certain protection.

As reseeding by natural means would not even up this stand of grass quickly enough to keep weeds in check, the several plots were resown (3rd to 6th September, 1930) with 5 lb. of Rhodes grass per acre and Sudan 8 lb., White Panicum, Japanese Millet, Liberty Millet, and French Millet 10 lb. per acre respectively.

Winter Series, 1930—Six plots, each 3 acres in area.

PLATE 155.—SOWING RHODES GRASS AND SEED OF COVER CROPS.

PLATE 156.—COVER CROP OF WHEAT.

Seed sown, 9th February, 1930; Germinated, 20th March, 1930. Crop weighed, 29th August, 1930; Yield, 9·8 tons per acre.

Green fodder weights of cover crops used with the lucerne and grass mixture in this series (vide June report) were as follow:—

Cover Crop.	Date Sown.	Date Germinated.	Date Weighed.	Yield per Acre (Tons).
Wheat	9–2–30	20–3–30	29–8–30	9·8
Oats	10–2–30	20–3–30	29–8–30	14·4
Barley	10–2–30	20–3–30	9–7–30	10·0
Canary Seed	11–2–30	20–3–30	7–9–30	14·4
Rye	11–2–30	20–3–30	29–8–30	11·2
Dwarf Essex Rape	12–2–30	20–3–30	10–7–30	14·0

Photographs of several plots appear in the letterpress.

SUMMARY.

Conclusions drawn to date from this, the first winter series of experiments are, that the method of frilling and poisoning the timber and of sowing seed on top of the rotting pear, offered a practical means of making profitable use of this class of country quickly. It also demonstrated that, although the seeds and grain were variable in character, size, and weight, each kind germinated satisfactorily without covering of any kind, on a rough, uninviting surface; however, the latter's virtue and richness, like many things in nature, lay dormant immediately below it. Fairly heavy seeding was adopted as loss of seed and young plant life seemed inevitable.

Surface and tap-rooted plants were chosen to provide, as far as possible, for a balanced ration to fatten stock quickly; for drought resistance, also for permanent pasture plants which would persist after those of annual habit had served their purpose. Modification both in the quantity and variety of seed appears necessary, if only from the standpoint of cost.

Feeding Off.

Thirty-four acres comprising the first of the summer (16 acres) and winter (18 acres) series of experiments was stocked with cattle of mixed sexes, principally growers; those of fattening ages being limited in number.

Details of Stocking.

Date Put On.	Kind.	Number.	Date Removed.	Kind.	Number.	Remaining until 22nd October, the Date of Sale.
12–9–30	Cattle	58	29–9–30	Cattle	30	Cattle 51
12–9–30	Horses	4	29–9–30	Horses	4	Cattle 3 (House Cows)
17–9–30	Cattle	26				

Cattle were in fair to forward condition when stocking of plots commenced 12th September, 1930. Eighty-eight were drafted on 29th September and 51 (34 steers 2½ to 4 years and 17 heifers and cows 3 to 4 years) in more forward to half fat condition put back to fatten and to remain until 22nd October, the date fixed for a local cattle sale.

Preference was shown for the different grasses and cover crops in the following order:—*Phalaris bulbosa*, Prairie grass, and Lucerne were grazed right away; then Canary seed, oats, wheat, barley, rye, and lastly Dwarf Essex rape. The cattle naturally paid more attention to the crops than to the Rhodes grass. It was observed that the amount and variety of fodder available soon effected an improvement in their appearance and condition.

At the time the cattle were introduced the Rhodes grass in the summer series was well established, up to about 18 inches in height, and as a result of the protection afforded by the standing timber and the volunteer growth of "milk" thistles and herbage, it was still soft and succulent and unaffected to any notable degree by frost.

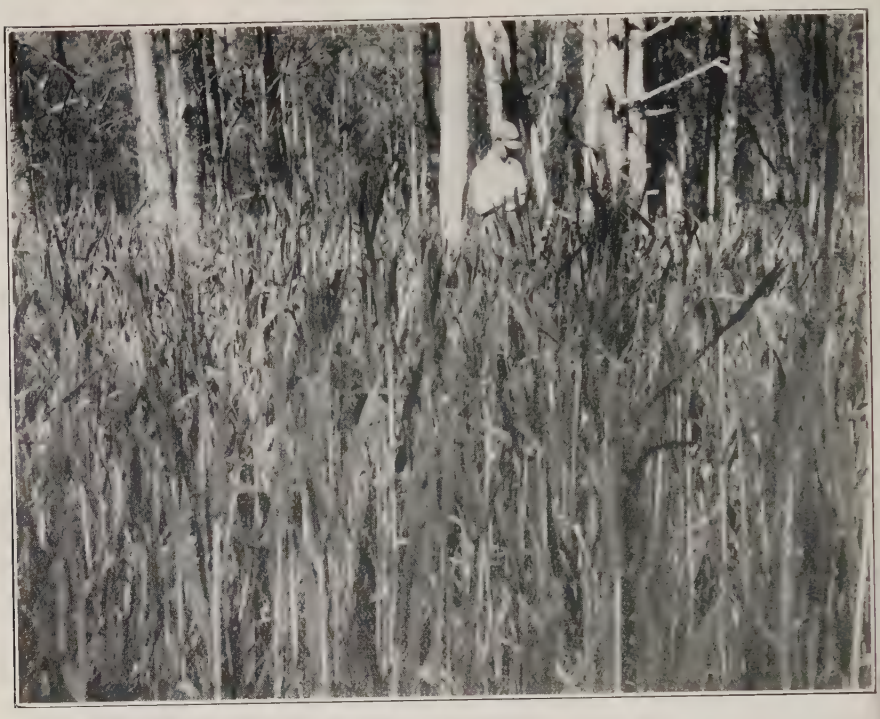


PLATE 157.—COVER CROP OF BARLEY (CAPE AND SKINLESS).
Seed sown, 10th February, 1930; Germinated, 20th March, 1930. Crop weighed, 9th July, 1930; Yield, 10 tons per acre.

PLATE 158.—COVER CROP OF OATS.
Seed sown, 10th February, 1930; Germinated, 20th March, 1930. Crop weighed, 29th August, 1930; Yield, 14·4 tons per acre.

Extension Work to Embrace the 1930-31 Season.

The original experiment area of 70 acres was increased to 134 acres, two seasons' operations being deemed necessary to provide for confirmation of present data, conditions on the new section being to all intents and purposes similar to those on the old.

Frilling and Poisoning of Timber.

This was done by contract on 64 acres at the rate of 7s. 6d. per acre. Work was commenced the second week in July and finished on 2nd August, a 20 per cent. solution of arsenic pentoxide was applied immediately the trees were frilled, by means of an atomiser (stainless steel); a short length of rubber hose (2 feet 6 inches), acorn nozzle and trigger control being substituted for the standard atomizer fitting. Six pounds of arsenic pentoxide per acre were used. Rhodamine B being added as a colouring agent to the poison, the cost of which latter was under a half-penny per gallon.

The sap was free, the soil and subsoil moist and the brigalow trees were in flower whilst the above work was in progress.

An excellent "kill" appears to have been obtained, the trees showing the effect of the poison within a few days of its application.

Half of this area is being reserved for the 1931 winter series of experiments.

Seeding Operations 1930-31 Summer Series.

Four plots, each approximately 8 acres in area were sown, 11th to 13th September, with the following mixtures, the seed being broadcast on top of the rotting pear to await sufficient rain to germinate it. Quantities per acre and price per lb. shown in parenthesis—

Rhodes grass (5 lb., 1s.); Sudan grass (8 lb., 5½d.); includes 3 acres Star Leaming maize (50 lb.).

Rhodes grass (5 lb., 1s.); White Panicum (10 lb., 6d.).

Rhodes grass (5 lb., 1s.); Japanese Millet (10 lb., 3d.).

Rhodes grass (5 lb., 1s.); Liberty Millet (Setaria) (10 lb., 3d.).

In order that comparison might be made between this latter section, seeded six weeks after the timber was poisoned; and another where the timber was poisoned last March, duplicate plots four in number, each 7 acres in area, were seeded 3rd to 6th September. Additionally 5½ acres were divided into three irregularly-sized plots and sown with Rhodes grass alone and Rhodes grass with cowpeas and Soya beans respectively.

Percentage Poisoning Tests.

Contiguous areas, thickly timbered, principally with brigalow, were chosen for this experiment, each approximately one-sixth acre in size, all conditions being comparable.

"Frilling and poisoning" was acrried out in March. The following percentages were used:—2½, 5, 7½, 10, 12½, 15, 17½, and 20. The weaker solutions did not appear to be as efficient as those ranging from 10 to 20 per cent. The "kill" effected by the 20 per cent. solution was, however, very decisive in character and was consequently adopted as the standard for all subsequent poisoning work and in this its efficiency was confirmed. The per cent. tests cannot be regarded yet as final.

Monthly Poisoning Tests.

In this series, sections each 1 acre in area were poisoned monthly throughout the year. In October and November there was a slight tendency of the brigalow to sucker from the main roots, at a short distance from the butts of the trees. The soil and subsoil at this period was more or less dry. These suckers, when several inches in length, were sprayed with an atomizer, a 20 per cent. solution of arsenic pentoxide being used. Three weeks afterwards they were rotten at the base. Except for the Sandalwood and Wilga, on which the effect of the poison was irregular, the trees generally were affected by the arsenic pentoxide within several days after its application. A regular count was maintained. Whip stick sized saplings, small Wilga and undergrowth were cut off close to the ground with a V-shaped cut and well sprayed, small bushes of *Cassia ovata* being similarly dealt with.

PLATE 159.—COVER CROP OF RYE.

Seed sown, 11th February, 1930; Germinated, 20th March, 1930. Crop weighed, 29th August, 1930; Yield, 11·2 tons per acre.

PLATE 160.—COVER CROP OF CANARY SEED.

Seed sown, 11th February, 1930; Germinated, 20th March, 1930. Crop weighed, 7th September, 1930; Yield, 14·4 tons per acre.

PLATE 161.—COVER CROP OF DWARF ESSEX RAPE.
Seedsown, 12th February, 1930; Germinated, 20th March, 1930. Crop weighed, 10th July, 1930; Yield, 14 tons per acre.

PLATE 162.—FEEDING OFF THE PLOTS.

Observation showed that the most important feature of any poisoning work is to carry it out almost simultaneously with the axe cut. Efficient axe work is also necessary; an "open frill" is desirable and should be made with a series of clean, sharp axe cuts, a wrench of the wrist being given as each chop is delivered, to free the outside of the sap wood and bark from the tree.

In this district the most promising period for timber destruction appears to be from late February to July. When the soil is moist and the sap is quite free, it may be extended into August, particularly in the case of late flowering trees.

Other Poisoning Work.

Boring ¾-inch auger holes close to the ground in the butts of a limited number of brigalow trees and filling them with "poison" was tried, but the only effect was to kill a narrow strip of bark, about 2 inches in width up the trunks of the trees.

A similar test was carried out with trees that had suckered after being frilled and poisoned, by boring directly into a main lateral root, at its junction with the trunk of the tree. This was equally as ineffective. There is no merit in either process.

Poisoning Box Trees.

Early in August the following tests were initiated:—Ringbarking alone (10-inch band); ringbarking and immediately spraying the sap wood with an atomizer, using a 20 per cent. solution of arsenic pentoxide; ringbarking and frilling combined; ringbarking, frilling, and poisoning; cutting box saplings down close to the ground with a V-shaped cut and spraying the cut surfaces with poison. Time is required to complete the tests.

Acknowledgments.

This department's thanks are tendered to Mr. J. B. Henderson, O.B.E., F.I.C., for the excellent photographs used to illustrate this progress report; also to the members of the Prickly Pear Land Commission for supplying, free of charge, all the arsenic pentoxide used in the experiments.

CARE OF THE CAR.

Springs make riding in a road vehicle at high speed possible; without springs the motor car would shake itself and the passengers to pieces within a very short time. Three types of springs are found in most cars to insulate the passengers from the shocks caused by the car striking bumps in the roads. These springs are th resilient tyres, the main springs, and the springs in the upholstery.

The Tyres.

The pneumatic tyre is an excellent form of spring, and performs the very vita function of eliminating almost entirely the quick, short vibrations that otherwis cause the whole car to vibrate. The old high pressure tyres performed this functio in part, but the modern balloon tyre does the job very thoroughly indeed. Fo example, it is possible to drive over a road the surface of which is loose grave and to feel not the slightest tremor within the car.

Not only must the springing be considered as a means of protecting th passengers, but also as a means of protecting the car. The wheels and axles ar protected by the tyres only, and, therefore, are referred to as unsprung weigh While on the subject of tyres it might be well to mention the marvellous progre that has been made towards perfecting the tyre in the last few years. High-pressu tyres have been superseded by ballon tyres, and the 1930 tyre is less liable to blo out, and wears longer than any of its predecessors. The latest reports from abroa indicate that in a little time decorated tyres coloured to harmonise with the bo of the car will be on the Australian market. No doubt the lady motorists of t near future will select the footwear of their motor cars and be influenced in doi so by the prevailing fashions.

The Main Springs.

The casual observer of progress in motoring would probably give most credit for the excellence of the modern car to its excellent engine. The writer is of the opinion, however, that the outstanding feature of the modern car is its comfort and stability on the road. Comfort and stability are essentially matters of spring design and distribution of the weight of the car. Springs on modern cars vary considerably in their design. The transverse spring, as its name implies, is one that is fixed across the car. The "Ford" is the best known car containing this type of springing. It has the virtue of being a cheap, simple construction, which gives good springing and excellent road holding to the car.

The full elliptic spring is one that is like a complete ellipse. This type of spring is unusual on modern cars, but is commonly seen on horse-drawn vehicles. The construction is expensive, and although the springing is excellent, good results are obtained from simpler systems. The "Franklin" car still retains this rather elaborate system of springing, and is renowned for its comfort.

The semi-elliptic spring is the usual type used on motor vehicles. In this type of spring the axle is clamped to the centre of a bow-shaped spring, either end of which is fastened to the frame. It is usual for one end to be fixed and the other end to be fastened through a shackle link. This loose coupling of one end is essential since the spring straightens ont and therefore lengthens when a bump is taken.

The quarter elliptic spring is probably the simplest type of main spring found on the car. One end of this type of spring is clamped to the frame of the car, and the other end to the axles. No shackles are needed since both ends are rigidly clamped. This type of spring has been intensively used in England, and if it is correctly designed, it gives excellent results, although there is a tendency among car manufacturers to discontinue the use of this spring.

The cantilever spring is only found on the rear axle of some cars, and as its name implies, works on the principle of a cantilever. The spring is really a semi-elliptic spring used upside down. The axle is fastened to the back end. The middle is fastened to the frame of the car through a bearing, and the front end is also fastened to the frame of the car. The "Rolls Royce" car and other high-grade machines use this type of spring.

It is the aim of all designers of motor cars to reduce the unsprung weight in the car. In almost all cars the tyres, wheels, and axles are unsprung weight, and also the portion of the spring that is fastened to the axle. With semi-elliptic springs the heaviest portion is fastened to the axle, whereas with cantilever the lightest portion is fastened to the axle. However, this advantage is offset by the fact that some form of torque tube or stays must be provided to prevent the axle from twisting under the influence of the driving force, and thus the unsprung weight is augmented.

The quarter elliptic spring has little unsprung weight, but because of its design, allowance must be made for the front axle moving forwards and the rear axle backwards when the springs are depressed.

Many drivers neglect the springs and the shackle bearings of their cars for months at a time, although they see to it that the engine is well oiled. These drivers must fail to realise the amount of working done by the springs and shackles. It is only necessary to drive behind or beside another car that is passing over a reasonably rough road to notice the tremendous work done by the springs. The wheels are constantly shooting up and down, while the body moves along comparatively steadily.

The ordinary spring consists of several leaves of high-grade steel. These leaves slide over one another when the spring is flexed. The spring should always be kept oiled, so that this sliding motion is not hampered by friction. A dry spring not only wears, but also produces an unpleasant squeaking noise.

Some drivers believe in keeping the springs dry, so as to make them act as shock absorbers. This is a foolish policy, for if shock absorbers are desired they should be fitted rather than an attempt made to force the spring into a service for which it was never intended.

Most modern shackle bolts require oil or grease, which should be injected regularly. There are, however, a number of rubber and fabric shackles in use to-day which do not require greasing. Mention was made at the beginning of this article of the springs in the upholstery. These springs do not concern the motorist very much until the covering of the cushions is worn through; the spiral springs of the seats are then likely to have a disastrous effect on the clothing of those who sit upon them.—"Radiator," in the "Farmer and Settler."

AUSTRALIAN TRADE WITH THE EAST—I.

By Colonel D. E. EVANS, D.S.O., M.I.E.S., M.I.M.E.

The following notes by Colonel Evans, who is well known in Brisbane commercial and professional circles, were made in the course of a recent visit to Japan, Korea, Manchuria, and China, and will be read with much interest by all concerned with the expansion of Australian trade with the East, especially in relation to our primary products.

THE impression formed on my recent visit to the East was that Australia could get further trade. Japan has no great potential wealth other than the industry of her people. Manufacture is carried out mainly from imported raw material (other than silk) and the finished article is exported. It is on the wealth of Japan's labour that they have to depend, most foodstuffs being bought from outside. Korea supplies a good deal of these, but large importations of rice and other foodstuffs are made from outside countries. While being shown over the Yokohama Earthquake Memorial Museum, the Mayor brought under notice a chart showing assistance given in relief, and pointed out that Australia, on a population basis, gave more relief than any other country. Samples of the relief goods were on view, including Australian canned beef and condensed milk. It was remarked by a Japanese that it was a pity these brands were not available in Japan at present, because the people would like to trade with Australia. Tinned foods receive a ready sale in Japan, but the origin is generally America.

Hardwood.

Japan has little or no cheap hardwood timber, and softwood timbers are being used for sleepers on the railways. It would appear that a good hardwood timber business could be worked up in this country. This also applies to China and Manchuria.

Primary Products.

Manufactures from Australia generally have little chance in competition with the cheap labour of the East, except where the primary product can be favourably produced in Australia. For instance, Australia has a big export to the East of flour, butter, and meat, which are very favourably received. Japan takes our wheat and manufactures her own flour, but Southern China, Dutch East Indies, Malay States import our flour direct.

Beautiful fruit is grown in North China and Japan, and is plentiful, but as we have the opposite seasons a fruit trade there is possible.

Australian fruit is beginning to find a market in Java, and if proper care in selection and shipping is exercised I predict a steady increase in trade.

Queensland hams and bacon are favourably received in the East, but we should be able to get more of the trade.

The Eastern races are fast acquiring Western ideas in dress, customs, and foods, and it is mainly the latter that presents the greatest opportunity to Australia.

Owing to the prevalence of disease in the East, and the insanitary method of growing vegetables, it is not safe to eat vegetables that are not cooked. From Hongkong north this trade is supplied from America. Australia is in a good position to supply these needs, and a ready trade is available to countries north of Australia, while good shipping facilities exist between here and Singapore.

With the wide climate variations that exist from North Queensland to Tasmania, we can grow practically all the requirements of our northern neighbours, and our seasonable products are marketable in North China and Japan at a time when there is no competition, except where costly cold storage is necessary to market goods out of season.

It is not necessary to mention wool (Japan is already one of Australia's largest buyers), but only to say, when China becomes peaceful and settles down, I predict she will be a big buyer, as the many millions in North China, with their severe winters, are sadly in need of warm clothing.

Plate 163.—Primitive Transport in Manchuria. The Famous One-Wheel Cart utilising the Sail.

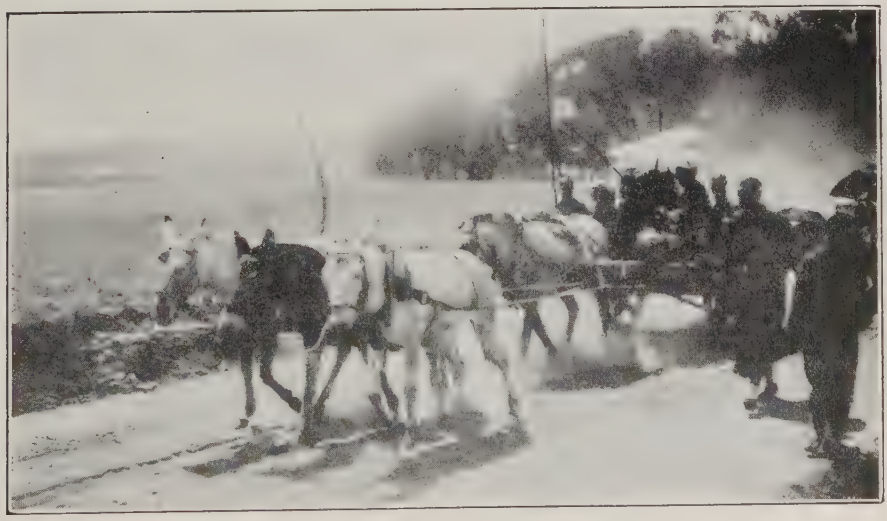


Plate 164.—Country Folk in Manchuria Enjoy an Outing.

PLATE 165.—AGRICULTURAL EXPERIMENT STATION AT KUNGCHULING, SOUTH MANCHURIA

PLATE 166.—EXPERIMENTAL KOALIANG PLANTATION AT KUNGCHULING.

Manafactures—Labour Conditions.

Speaking of manufactured articles generally, I see little chance of capturing trade in the East.

Information on labour conditions may be of interest. In Japan the average wage of male labour is about 3s. a day; child labour to women workers range from 4d. to 2s., working in most cases ten to twelve hours a day, and in the various industries can be considered good labour, although in heavy manual work would not be as good as Australian labour working for commercial firms. In Korea and Manchuria and China generally, good male labour is available for 1s. 6d. a day; child and female labour 4d. to 1s. a day, working twelve hours a day. In Shanghai children eight to ten years of age working in textile factories often walk 6 miles to work, making 12 miles walking and twelve hours working. A Chinese engineer in charge of a large textile factory employing 4,500 people informed me that his heart went out to these poor Chinese girls, who, working under the conditions stated, would sometimes fall asleep at their work and be discharged. Under conditions such as these the Australian manufacturer has little chance in competition.

In Korea and Manchuria, where they have large concessions, the Japanese have not been able to absorb their over-population, mainly because Chinese labour is cheaper, and the Japanese, having a higher standard of living, are unable to compete.

PLATE 167.—A BROAD RICE FIELD IN MANCHURIA.

Trade.

Conditions generally in the East, with the exception of Dutch East Indies, are depressed. Japan, since the war with Russia, has made wonderful progress in industry, and during the Great War built up organisations in industries which were kept going to full capacity until a few years ago. These industries absorbed the large increased population, but with the world-wide depression many of the large industries are only working at half usual capacity, consequently much unemployment now exists in Japan.

China is in such an unsettled state with civil war—the armies mainly living on the industry of the people—that there is no stability of trade outside British territory and international concessions. Payments from the Government are delayed, and there is a general lack of confidence.

Singapore, Malay States, and neighbouring countries depending largely on tin and rubber, are feeling very much the drop in prices; but, unlike our position with wool, the prices obtaining will still allow the industry to be profitably continued in most cases.

In all these places the very prosperous times enjoyed for several years are reflected in the great improvements in private and public services. Beautiful and substantial buildings have been erected, and roads, harbour improvements, &c., give indication of money in plenty; but the general opinion now is that their products have reached the lowest values, and that in future conditions will be more stable.

[TO BE CONTINUED.]

OBITUARY.

ALBERT H. BENSON.

Queensland horticulturists, as well as those engaged in other branches of rural industry, lost a good friend in the late Albert H. Benson, M.R.A.C., who died in Brisbane on 16th October. Formerly Director of Fruit Culture in the Department of Agriculture and Stock, Mr. Benson retired from official life under the age limit provisions of the public service in March, 1927. Since then he had been associated in active partnership with his son, Mr. Harry Benson, in banana-growing and dairying at Kandanga and Brooloo.

The late Mr. Benson was the only son of the late Joseph Benson, a pioneer Queensland squatter in the Burnett district during the fifty's of last century. He was born near Taunton, in Somersetshire, England, on his father's estate, and was educated at Taunton College and the Royal Agricultural College, Cirencester, of which he was a member and gold medallist. He had been connected with agriculture during the whole of his life, and was a recognised authority on fruit culture. Shortly after he was twenty-one Mr. Benson was given the management of an agricultural estate is East Lothian, Haddingtonshire, Scotland, a county noted for its good farming. There he gained experience in growing various farm crops and breeding and fattening sheep and cattle, as well as raising fat lambs for the English market. He occupied that position for five years, when his employer, having accepted the Governorship of Madras, decided to let all the farms that had been under his management. Having heard a very glowing account of the prospects for successful culture of fruit in California, Mr. Benson decided to go to that country, where he remained five years, and gained practical experience in all branches of the fruit industry as well as a general insight into American methods of agricultural investigation and experiment station work, besides taking a course of training at the University of California.

Mr. Benson left California for Sydney early in 1892, and was offered the position of fruit expert to the New South Wales Department of Agriculture, and was the first person in the Commonwealth to be given that title. His work was not confined solely to fruit matters, but the knowledge he had gained of American agricultural and horticultural experiment work was made use of in the establishment of the Wagga, Bathurst, Pera Bore, and Wollonbar experiment farms. The value of his work was appreciated very highly by the then Premier of the Mother State (the late Right Hon. Sir George Reid) and Minister for Agriculture (Mr. Sydney Smith).

In 1896 Mr. Benson was offered the position of instructor in fruit culture for Queensland by the late Colonel A. J. Thynne, then Minister for Agriculture. His services in this State also were not confined to the fruit industry, but included general agriculture as well. Much of his instruction in fruit culture was of a practical nature, given in the orchard itself, and included cultivation, manuring, pruning, pest destruction, and handling and packing fruit for market.

Early in 1908 Mr. Benson was sent to England as a representative of his department at the Franco-British Exhibition, and was absent for twelve months. On his return he visited Ceylon and the Federated Malay States to obtain information in connection with tropical agriculture, and pineapple

canning in particular. He resumed his duties as instructor in fruit culture early in 1909, but resigned his position at the end of March, 1910, to take up that of Director of Agriculture in Tasmania. Here his early training proved of great value, as his duties necessitated having a good general knowledge of agriculture, stock, and fruitgrowing.

In 1915 Mr. Benson returned to Queensland as Director of Fruit Culture, which position he held until his retirement.

PLATE 168.—THE LATE MR. A. H. BENSON, M.R.A.C.

On many occasions Mr. Benson acted as judge at the Royal National Shows, and he was also an honorary council steward of the association. The deceased gentleman is survived by his widow and one daughter (Mrs. E. A. Ferguson, Norman Park) and a son (Mr. Henry Benson, of Mount Kenilworth, Brooloo).

SEED MAIZE IMPROVEMENT.

By C. J. McKEON, Instructor in Agriculture.

The high quality of Queensland-grown grain is commended generally, and the standards reached are the results of many years of steady effort by Departmental plant breeders. In these notes, abstracted from the Annual Report of the Department of Agriculture and Stock, Mr. McKeon reviews the work of the past year in maize improvement.

WEATHER conditions in the early months of the maize-planting season were not generally favourable, with the result that the early crops as a whole were light. The rainfall, more especially in some of the more inland districts, was very scattered, and it was not possible for a general planting to be made. These conditions prevailed until late in November and early December, and consequently many of the crops were either light or practically failures for grain purposes. Good general rains, however, fell throughout the maize-growing districts during December, and conditions from then on were very favourable, with the result that the late-sown crop will be a good one generally.

The prices received for this season's maize were very good, considering the quantity of late market deliveries.

Although a fairly large area was again planted on the Atherton Tableland, the yield will not be heavy owing to abnormal conditions during the early part of the season. In January and February over 40 inches of rain fell, and as a result rust appeared in many of the crops. Fortunately, weather conditions improved, otherwise many of the crops would have very light.

Propagation Plots.

Propagation and stud plots were established in the Kingaroy, Mary Valley, Kilcoy, and Boonah districts. These comprised approximately 120 acres, the following varieties being used:—Improved Yellow Dent, Golden Beauty, Star Leaming, Reid's Yellow Dent, and Funk's 90-Dday.

The fertiliser trials with Star Leaming, carried out at Kingaroy the previous season, were continued this season on the same farm.

Results as a whole were very good, and some very fine yields were obtained; and although some of the early crops suffered from dry weather during tasselling, none was a failure. Weather conditions were very much favourable for the mid-season and late varieties, in fact the yields in some instances being reduced through too much rain. Good supplies of seed have been secured from the crops harvested, the quality being excellent. Several crops of Golden Beauty and Improved Yellow Dent have yet to be harvested, and further supplies of very good seed will be available, particularly from the plots of Golden Beauty.

Funk's 90-Day.

Four plots of this variety were sown, and one was not used for seed selection owing to the fact that weevils attacked the grain in the field, and by the time the crop was harvested the ears were too badly damaged to be used for seed purposes. Two of the crops gave very good yields, particularly one at Imbil. The actual yield could not be secured owing to the limited barn space not permitting of the whole of the crop being kept separate after the seed selection work was completed, but from what was threshed the computed yield was 90 bushels per acre. This crop created extraordinary interest amongst local farmers, and quite a number expressed their intention to grow this variety next season. The type and quality of the seed selected fro mthis crop were excellent, and it is pleasing to note that the reddish-tinted grains, so much in evidence when this variety was first introduced by the Department are fast being eliminated. Field characteristics have also shown a very decided improvement, the husk covering throughout the whole of these crops this season being particularly good. An ear to row test of this variety was sown, but was very badly damaged by hail when the plants were well above ground, and the stand was too irregular to be used for making comparisons of yield.

Star Leaming.

Results from these plots were on the whole very good, two of the five yielding particularly well, whilst very fair yields were obtained from the remaining three. An ear to row test plot was carried out at Kilcoy, the yields from which are shown later. In this plot the germination was very irregular, many of the rows being very thin. The uneven germination was caused through unfavourable weather conditions at the time of planting. Although good soil moisture was present and the drills were covered as quickly as possible, a considerable amount of this was lost in opening up for planting, the weather conditions being hot and dry and remaining so for some time afterwards. The propagation plot which surrounded the ear to row test plot was sown with a maize planter, and a very fine germination resulted. The type throughout the whole of the plots was particularly even, and the quality of the seed selected was splendid. This variety was again used in the fertiliser trials which were condusted on the same farm at Kilcoy as that on which the previous trials were carried out. In this season's trials the paddock was divided up into 144 plots, each measuring $\frac{1}{100}$th of an acre, eleven different mixtures being used, and the plots being randomised; each mixture was replicated twelve times, the remaining twelve plots being unmanured and used as controls.

The land received a thorough preparation, and was in very fine order at the time of planting, with a fair amount of moisture present. Weather conditions for some weeks after planting were particularly hot and dry, and a considerable number of the young plants were burnt off before good rain fell. The stand was therefore thinner than was desired, but this was uniform throughout and did not materially affect the results for comparison purposes. Weather conditions, however, improved when the plants were 1 foot high, and favourable conditions were experienced during the remainder of the growing period. During growth no difference was noticeable in any of the plants. The particulars of the yields of the various plots which are given are only tentative, as the final figures and conclusions will be arrived at by the Agricultural Chemist.

The following mixtures were used; the quantities shown being the rate per acre:—

Series marked N—100 lb. sulphate of ammonia.

Series marked $\frac{1}{2}$ Ps—75 lb. superphosphate.

Series marked Ps—150 lb. superphosphate.

Series marked K—100 lb. potassium sulphate.

Series marked NPs—100 lb. sulphate of ammonia, 150 lb. superphosphate.

Series marked NK—100 lb. sulphate of ammonia, 100 lb. potassium sulphate.

Series marked NPsK—100 lb. sulphate of ammonia, 150 lb. superphosphate, 100 lb. potassium sulphate.

Series marked PsK—150 lb. superphosphate, 100 lb. potassium sulphate.

Series marked NPnK—100 lb. sulphate of ammonia, 150 lb. Nauru, 100 lb. potassium sulphate.

Series marked Pn—150 lb. Nauru.

Series marked S—50 lb. flowers of sulphur.

Series marked O—Unfertilised.

Average yield per acre of 12 plots of N series—42.9 bushels.

Average yield per acre of 12 plots of $\frac{1}{2}$ Ps series—43.9 bushels.

Average yield per acre of 12 plots of Ps series—45.1 bushels.

Average yield per acre of 12 plots of K series—43.7 bushels.

Average yield per acre of 12 plots of NPs series—47 bushels.

Average yield per acre of 12 plots of NK series—42.6 bushels.

Average yield per acre of 12 plots of NPsK series—46.1 bushels.

Average yield per acre of 12 plots of PsK series—47.3 bushels.

Average yield per acre of 12 plots of NPnK series—45.7 bushels.

Average yield per acre of 12 plots of PN series—44.5 bushels.

Average yield per acre of 12 plots of S series—43.9 bushels.

Average yield per acre of 12 plots of O series—42.5 bushels.

The highest average yield was obtained from the plots treated with the PsK mixture—viz., 47.3 bushels per acre. Average yield from controls was 42.5 bushels per acre. The cost per acre of the PsK mixture was £1 15s.

Star Leaming.

Ear to Row Test.

Row No.	Yield per Acre. Bushels.
403 x 191	32.9
403 x 192	57.1
403 x 193	38.0
403 x 194	30.7
403 x 195	43.2
403 x 196	53.4
403 x 197	33.6
403 x 198	39.5
403 x 199	57.1
403 x 200	54.9
Check	42.4
403 x 201	46.1
403 x 202	50.5
403 x 203	54.9
403 x 204	46.1
403 x 205	60.0
403 x 206	54.9
403 x 207	58.5
403 x 208	55.6
403 x 209	60.0
403 x 210	46.1

Note.—Rows 403 x 191 to 403 x 200, also the check row, did not germinate as well as the balance of the plot.

Reid's Yellow Dent.

Two plots, one of 10 acres and the other of 7 acres, were planted, and the results were very disappointing. The former plot made wonderful growth and yielded very well, but unfortunately this could not be used for seed purposes owing to a crop of another variety being sown alongside at practically the same time. The other plot was sown early, and consequently had to contend with dry weather until after the tasselling was finished, and the crop was naturally a light one. Sufficient seed, however, was secured for further plot work.

Golden Beauty.

All plots sown with this variety did very well, one crop in particular being outstanding in every way. None of these has yet been harvested, but the yield and quality will be excellent. The field characteristics as usual were wonderfully good, particularly the husk covering and the direction of the ear on the plant when ripening. The height at which the ears are borne was also very regular, and is more noticeable probably in this variety than any of the others. Good supplies of seed of this variety will be available for distribution this season.

Improved Yellow Dent.

Arrangements were made for several plots of this variety, but only two of these were finally planted owing to the other growers being unable to get the land ready in time. Both crops made good growth, but one of these did not cob as well as is usual for this variety owing to excessively wet conditions. This, however, should give a fair yield. An ear to row test was sown with this crop, but was badly checked during early growth through water remaining on the surface of the land. Weeds also made great headway owing to the sodden nature of the ground not permitting of inter-row cultivation being carried out for several weeks after the crop was above ground. A few rows which were not subjected to flooding made good growth, but the remainder will be too poor for comparison purposes. The other crop made excellent growth, and although rather too much rain fell during the growth of the crop a good yield resulted. The ears on the whole were fairly large and were particularly well filled. The type throughout was excellent, and a large quantity of very nice quality seed was selected.

Northern Seed Maize Improvement Scheme.

This work was continued on the Departmental plot at Burnside, Tolga. Approximately 70 acres were sown, and the results from one portion (30 acres) were excellent, whilst the yield from the other portion sown at the same time and only about 2 chains away was very poor. Weather conditions during January and February were very unfavourable owing to lack of sunshine and the continuous rain, which amounted to over 40 inches for these two months. As a result rust appeared, one portion of the crop suffering very much more severely than the other. Weather conditions, fortunately, improved, and bright, warm weather followed, otherwise the damage, not only to this crop but to a large percentage of those throughout the Tableland, would have been very severe. The type and quality of the grain on the best portion of the Departmental plot were particularly good, and the percentage of grain affected with Diplodia was very small indeed, as was also the percentage of barren plants. The crop at the time of inspection was ready for harvesting, and some very fine selections of seed were made for further plot work. Three comparative trials with this variety and a selection from the local maize were conducted, and the results were as follows:—

Farm No. 1.—Local maize—Barren plants, 13 per cent.; Diplodia, 9½ per cent.; other moulds, 4 per cent. Yield per acre, 26.5 bushels. Durum—Barren plants, 13 per cent.; Diplodia, 11 per cent.; other moulds, 4½ per cent. Yield per acre, 21 bushels.

Farm No. 2.—Local maize—Barren plants, 11.6 per cent.; Diplodia, 12 per cent.; other moulds, 5.6 per cent. Yield per acre, 54.7 bushels. Durum—Barren plants, 7.6 per cent.; Diplodia, 13 per cent.; other moulds, 5 per cent. Yield per acre, 40.6 bushels.

Farm No. 3.—Local maize—Barren plants, 2½ per cent.; Diplodia, 13 per cent.; other moulds, 13½ per cent. Yield per acre, 81.9 bushels. Durum—Barren plants, 5½ per cent.; Diplodia, 9½ per cent.; other moulds, 11 per cent. Yield per acre, 63.8 bushels.

The plots on Nos. 1 and 2 suffered from rust, and all were damaged during growth by leaf-eating caterpillars, the damage in the case of the former crop, being very severe. In the crop sown on No. 3 farm the damage to the Durum from this cause was much greater than in the portion sown with local seed.

MAMMITIS.

By MAJOR A. H. CORY, V.D., M.R.C.V.S., Chief Inspector of Stock.

Under this heading may be included all derangements of the udder which are accompanied by inflammatory changes.

Of all the domesticated animals, the cow suffers most from this complaint, due to the extraordinary development of the mammary glands, as compared with those of the original type. Increased secretory power is accompanied by increased blood supply and glandular tissue, but a decreased resistance to disease.

Mammitis may be divided into two broad classes—(1) simple, (2) specific.

Simple Mammitis.

In the first class would be included all those forms in which the primary cause is mechanical, such as injuries, overstocking, irregular or improper milking. In these cases the onset of the disease is ushered in with local inflammation, in the area affected. This may be a portion or the whole of a quarter, or even one or more quarters may be involved. Should the affected area be extensive, there will also be constitutional changes, such as rise in temperature and loss of appetite. The local inflammation induces congestion, with the accompanying symptoms of heat, pain, hardness, and cessation of normal milk secretion. The secretion from the congested area is watery, and acid in reaction. This acid fluid, coming in contact with the normal milk in the teat duct, causes it to curdle, and the milk from that quarter will contain clots of curdled milk. Should proper attention be given to the case at this stage, the disease is arrested, and recovery quickly follows. First give a good active purgative, such as 12 to 16 oz. Epsom salts, mixed with a quart of warm water. To this mixture add a cup of treacle and a dessertspoonful of ground ginger, and give as a drench. Local treatment consists of hot foments to the part, and frequent milking. Fomentations to be of value must be long continued—at least two hours once or twice daily—and followed by well rubbing with equal parts of belladonna and soap liniments.

Specific Contagious Mammitis.

If treatment has been omitted at this stage, pus-forming organisms invade the inflamed area, gaining an entrance through the milk ducts. The affected area is now an ideal breeding-place, and they multiply very rapidly. Fluids drawn off at this stage will contain pus (matter) in addition to the curdled milk.

In the blood stream are certain cells called Phagocytes, whose function is to destroy invading bacteria. These Phagocytes collect in and around the affected area. If they are not sufficiently numerous to destroy the bacteria, they cluster in the surrounding tissue to prevent the spread of the invading organisms. But during this time the toxins produced by the bacteria have caused a breaking down of the cellular tissue, which, when mixed with the toxins, has a debilitating action on the organisms, which lowers their vitality. To further neutralise the action of the bacteria, certain substances known as Opsonines or Antibodies appear in the blood stream and collect around the affected area and eventually destroy the invaders. The organisms having been destroyed, the temperature of the part is reduced, but the presence of the pus produced by their activity still remains and acts as a mild irritant. Should it be small in quantity, it is absorbed into the system, but where the accumulation is considerable, an abscess is formed.

Should the seat of the abscess be deeply surrounded by tissue, the fluid portions are absorbed and a fibrous capsule develops around the remainder. Should the abscess be near the surface, an external opening is formed and the contents evacuated, and the broken-down tissue is replaced by non-secreting tissue. Occasionally the abscess breaks into a milk duct, and the pus can be drawn through the opening in the teat.

During what may be termed the secondary stage of the disease—that succeeding bacterial invasion—hot fomentation is of pronounced value, as it assists in reducing temperature by relaxing the tissues, and also induces a freer blood supply to the part. Should pain be severe, apply a mixture of equal parts of belladonna liniment and soap liniment. Should the weight of the organ cause distress, support it by a broad bandage about 2 feet wide, in which four holes have been made for the teats. Place the teats in the holes, and pass the ends over the loins, tying sufficiently tightly to support the weight of the udder.

This serious disease is continually being brought under notice through outbreaks occurring in dairy herds, and its spread may be attributed partly to the carelessness of the dairy farmer and partly to the want of proper hygienic methods of controlling it.

The disease is a catarral affection and is limited, in most cases, to the delicate mucous membrane lining the milk ducts of the mammary gland. As a rule there is very little heat or swelling; moreover, the affected parts are not particularly painful.

The disease is caused by a tiny chain-forming micro-organism, or streptococcus, which attacks the mucous membrane and, by the development of its poisonous products or toxins, causes a rapid destruction of tissue cells and leucocytes (or white blood corpuscles) which are attracted to the spot. These dead cells produce that peculiar feature of the disease—a yellowish, purulent discharge, or pus, which can be withdrawn from the affected quarter.

Symptoms.

In the acute form the first symptoms are a diminution in the milk yield (usually in but one quarter of the udder); a definite acidity of the milk, and a tendency for it to become rapidly coagulated. Gradually the milk assumes a dirty, brownish colour and becomes more curdly, the amount of secretion from the affected quarter diminishing owing to the thickening of the milk ducts, which finally become impervious and the whole quarter is rendered useless. The lesions develop slowly, and first one quarter then another of the udder becomes involved, and later the milk secretion is liable to stop entirely. It will be observed in some cases of slight infection that the milk does not appear to be curdled, and the deposit when settled is so very small as to be overlooked.

Methods of Transmission.

Undoubtedly the transmission of the disease from cow to cow is through the agency of the hands of the milker or the cups of the milking machine. This appliance, which was designed to enable the farmer to produce cleaner milk than by any other method, must be kept scrupulously clean, and the cups should be sterilised after each milking by means of washings with boiling water.

Before and after each milking of an affected animal, the hands of the milker and the teats and udder of the cow should be washed with some reliable disinfectant solution, such as Hycol, Kerol, or Cyllin diluted in the proportion of 1 part of disinfectant to 250 parts of water—that is, 1 teaspoonful to 1 quart. Care must be taken not to allow any of the milk or cream from healthy animals or any of the dairying utensils to become tainted with the disinfectant, as the flavour and odour might be detected in the butter. To obviate this the disinfectant, after being allowed to act for ten minutes, should be washed off with sterilised water—that is, water that has just previously been boiled and allowed to cool.

Once the disease has appeared in a herd, the owner should personally examine minutely every cow's udder before milking and note carefully the character of the first small quantity of milk drawn. Any cow that shows signs of the disease, or that is in any way suspicious, should be held over to the last for hand-milking, and on no account should the cups of the milking machine be used on her.

Milk from an affected cow must be considered dangerous. The animal should be milked last into a vessel kept specially for the purpose, and the milk scalded so as to destroy the mammitis germs and buried.

Vaccine Treatment.

Both preventive and curative treatment have been successfully carried out by means of vaccine prepared at the Stock Experiment Station, Yeerongpilly. When used as a preventive the vaccine confers a period of immunity to contagious mammitis which varies very considerably in individual animals, and in no case is it thought that this period exceeds twelve months. The most opportune time to use the vaccine for protective purposes is just before or after calving, when the cow is usually most susceptible.

A "stock" vaccine may prove useful as a curative, but the best results are usually obtained from an autogenous vaccine—that is, one prepared from the particular strain of germ affecting the animals it is proposed to treat. To prepare such a vaccine it would be necessary for the Government Bacteriologist, Stock Experiment Station, Yeerongpilly, to receive a few teaspoonfuls of strippings from the affected quarter of a cow, forwarded with as little delay as possible in a clean bottle with no preservative added. A few days are required to prepare the vaccine, which will remain potent for about six months.

Directions for Use.

The vaccine is injected into the loose subcutaneous tissue behind the shoulder in the same manner as tick fever inoculation is performed, and the ordinary 10 c.c. tick fever inoculating syringe and needle are necessary to carry out the work. These may be obtained from any veterinary supply house.

The full dose of vaccine in ordinary cases is 4 c.c., injected in two doses of 2 c.c. each, with an interval of forty-eight hours between the injections. Two injections of 2 c.c. each will usually effect a cure, but in cases of long standing it might sometimes be found necessary to continue the treatment.

Before the injections are commenced the syringe and needle, with the parts loosened, should be sterilised by boiling in water for ten minutes, and the skin of the animal at the proposed site of injection should be washed with a solution of Hycol, Kerol, or Cyllin—1 teaspoonful to 1 quart—for ten minutes.

CONTAGIOUS MAMMITIS VACCINE—SCALE OF CHARGES.

No. of Animals.	Charge. s.	d.
1	2	6
5	6	3
10	10	0
20	16	8
25	20	0
40	30	0
60	40	0
80	46	8
100	50	0

REMITTANCE MUST ACCOMPANY APPLICATION.

CLIMATOLOGICAL TABLE—SEPTEMBER, 1930.

Supplied by the Commonwealth of Australia Meteorological Bureau, Brisbane.

Districts and Stations.	Atmospheric Pressure. Mean at 9 a.m.	Shade Temperature.						Rainfall.	
		Means.		Extremes.				Total.	Wet Days.
		Max.	Min.	Max.	Date.	Min.	Date.		
Coastal.	In.	Deg.	Deg.	Deg.		Deg.		Points.	
Cooktown	30·08	82	67	88	14	57	24, 25	30	2
Herberton	..	75	51	82	14, 24	41	23	36	5
Rockhampton	30·13	81	57	87	10, 13	50	16	24	2
Brisbane	30·14	76	54	86	23	48	3	95	3
Darling Downs.									
Dalby	30·14	75	44	87	11	32	3	92	6
Stanthorpe	..	66	38	78	12	28	16,3	102	4
Toowoomba	..	69	45	78	9, 13	33	3	147	5
Mid-interior.									
Georgetown	30·04	90	61	95	15, 11	53	19	3	1
Longreach	30·07	86	53	97	12	45	24	0	0
Mitchell	30·14	76	43	89	9, 12	33	24	17	2
Western.									
Burketown	30·05	87	62	92	28, 29	55	4	0	0
Boulia	30·07	86	56	101	11	45	24	0	0
Thargomindah	30·12	76	52	95	8	42	27	12	2

RAINFALL IN THE AGRICULTURAL DISTRICTS.

Table showing the Average Rainfall for the Month of September, in the Agricultural Districts, together with Total Rainfall during September, 1930 and 1929, for Comparison.

Divisions and Stations.	Average Rainfall.		Total Rainfall.		Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Sept.	No. of Years' Records.	Sept. 1930.	Sept. 1929.		Sept.	No. of Years' Records.	Sept. 1930.	Sept. 1929.
North Coast.	In.		In.	In.	*South Coast*—continued:	In.		In.	In.
Atherton	0·66	29	0·71	0·19	Nambour	2·57	34	1·26	0·33
Cairns	1·70	48	1·21	0·96	Nanango	1·81	48	1·16	0·17
Cardwell	1·55	58	0·46	0·51	Rockhampton	1·33	43	0·24	0·03
Cooktown	0·59	54	0·45	0·26	Woodford	2·20	43	1·52	0·20
Herberton	0·49	43	0·36	0·28					
Ingham	1·52	38	0·80	0·39					
Innisfail	3·60	49	1·24	1·81					
Mossman	1·49	17	0·48	0·76	*Darling Downs.*				
Townsville	0·84	59	0	0·17					
					Dalby	1·69	60	0·92	0·08
Central Coast.					Emu Vale	1·74	34	1·54	0·28
					Jimbour	1·51	42	0·78	0·15
					Miles	1·38	45	0·78	0·11
Ayr	1·48	43	0	0·20	Stanthorpe	2·30	57	1·02	0·60
Bowen	0·84	59	0	0	Toowoomba	2·15	58	1·47	0·36
Charters Towers	0·77	48	0·21	0·10	Warwick	1·81	65	1·33	0·34
Mackay	1·62	59	0·07	0·24					
Proserpine	2·19	27	1·81	0·18					
St. Lawrence	1·27	59	0	0	*Maranoa.*				
					Roma	1·46	56	0·06	0·01
South Coast.									
Biggenden	1·54	31	1·45	0					
Bundaberg	1·64	47	1·54	0·18	*State Farms, &c.*				
Brisbane	2·00	79	0·95	0·48					
Caboolture	1·87	43	0·73	0·36	Bungeworgorai	1·03	16	0·13	0·02
Childers	1·81	35	1·64	0·11	Gatton College	1·55	31	1·15	0·20
Crohamhurst	2·65	37	0·21	0·35	Gindie	1·04	31	1·01	0
Esk	2·16	43	1·58	0·45	Hermitage	1·49	24	1·28	0·24
Gayndah	1·55	59	2·40	0·08	Kairi	0·66	16	..	0·45
Gympie	2·11	60	2·00	0·12	Mackay Sugar Experiment Station	1·53	33	0·18	0·02
Kilkivan	1·71	51	0·85	0	Warren	0·83	15	..	0
Maryborough	1·93	58	0·98	0·36					

GEORGE. G BOND, Divisonal Meteorologist.

LUNG WORMS IN CALVES.

By A. H. CORY, M.R.C.V.S., Chief Inspector of Stock.

This affection is known as verminous bronchitis, hoose, or husk. The worms found in the lungs are the *strongylus micruris* and *Strongylus pulmonaris*. The former are the larger, being about 1 to 3 in. long; whilst the latter is only $\frac{2}{3}$ to $1\frac{1}{2}$ in. in length. This disease has been known since the year 1744, when Ruysch discovered worms living in the air passages of calves. Nicholls also refers to the same disease in 1756, when it assumed an epizootic form in England.

STRONGYLUS RUFESCENS.

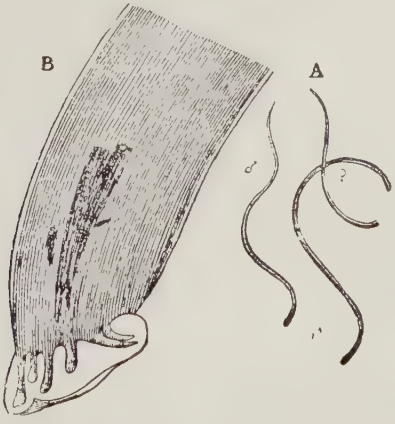
Caudal extremity of the male; magnified 100 diameters.—*Railliet.*

STRONGYLUS RUFESCENS.

Found in air passages of sheep and goats.

a—Male and female; natural size.

b—Caudal extremity of the female; magnified 50 diameters.—*Railliet.*



STRONGYLUS MICRURIS.

Found in air passages of calves and older cattle.

a—Male and female; natural size.

b—Caudal extremity of the male; magnified 100 diameters.—*Railliet.*

PLATE 169.

Symptoms.

If the worms are not very numerous, one notices an occasional husky cough; and, if the animals are driven or excited, the breathing may appear short and hurried. The disease gradually spreads from animal to animal until the majority exhibit this peculiar cough or hoose. After a few weeks, the cough becomes more frequent, and appears to be suffocating the animals—in some cases suffocation actually takes place. A frothy liquid sometimes streaked with blood is discharged from the nostrils. This discharge contains eggs, also embryo and mature worms. The movements of the worms are easily recognised, particularly when placed in a little warm water. The calf loses condition and strength; the mucous membranes of the eyes and mouth become very pale in colour; eyes sunken; skin hidebound, dry, and scurfy; the hair staring; and occasional diarrhœa. The animal wanders away from the others, and is found lying down apparently listless and poverty-stricken. The duration of the disease varies according to the number of worms present and the general condition and constitution of the animal. Some cases only last two or three weeks, whilst other survive for several months.

Upon *post-mortem* examination the worms can be found in the air tubes, the lining of which is inflamed; and the lungs frequently have a somewhat mottled or patchy appearance.

Prevention.

Healthy calves should be kept from paddocks where infested animals have been, but horses and sheep can be turned into them with safety. The land, if damp or boggy, should be drained; waterholes are a great source of infection, and should be avoided, if possible; buckets or troughs are better, as these can be frequently cleansed and disinfected. Keep up the strength of the animal by giving good nutritious food, and allow constant access to salt, because salt destroys the young worms as they are taken into the animal's body. Animals dying from this affection should be thoroughly burned or buried deeply.

Treatment.

The quickest and most reliable treatment is to inject a solution directly into the trachea (windpipe). Various solutions have been used; but the following is recommended, and is the dose for a calf:—

Oil of turpentine	1 drachm.
Carbolic acid	10 minims.
Chloroform	½ drachm.
Glycerine	1 drachm.

To be thoroughly mixed together before using each dose; then slowly injected by means of a syringe into the windpipe.

The needle of the syringe is inserted between the rings of the trachea (windpipe) about half-way down the neck. Some people advocate making a small incision in the skin with a clean knife before inserting the needle; but, if the needle is fairly thick and carefully handled when being pushed through the skin, it will be found unnecessary to incise the skin. This injection causes considerable distress to the animal by setting up paroxysms of coughing; but it passes off without setting up serious irritation, and is effective in destroying the worms.

In bad cases it is advisable to repeat the injection on two or three occasions, allowing some three days' interval between the injections; but in many cases one injection will be found sufficient.

If it is impossible to procure a syringe, a drench composed as follows can be given, but its action is not so effective:—

Oil of turpentine	½ oz.
Creosote	½ drachm.
Tincture of camphor	½ oz.
Milk or linseed oil	4 to 6 oz.

This drench should be given once or twice weekly for some three or four weeks.

Sheep, and particularly lambs up to twelve months of age, are similarly affected with worms in the lungs, although not the same worms as found in calves. The treatment described in these notes will be found just as effective, except that the dose of medicine given is considerably smaller—viz., about one-quarter to one-half of the above doses.

The Young Farmer.

TRAINING THE YOUNG FARMER.

DISCUSSING the training of young people for land industries in a recent issue of the "Live Stock Journal" (England), "Salopian," though writing especially for his readers in Britain, expresses some definite opinions on a subject of great interest to Australians, and his views are well worth quoting. This is what he says:—

In spite of the fact that no other industry has so bad a name as agriculture as a money-making business, there appears to be no diminution in the number of young men who are anxious to take up farming as a profession, so that the question of agricultural training is of greater importance than ever, considering the many problems and difficulties that must be faced and overcome if a living is to be made out of the land. Everything is cut so fine nowadays, and the margin of profit, where it exists, is so small that a thoroughly practical and scientific knowledge of everything connected with farming and livestock breeding and management is absolutely essential if that calling is to be made a success.

PLATE 170.—MR. A. SYBERG'S MILKING SHED AT MUGGLETON, NEAR ROMA.
This substantial structure was built of timber cut and sawn on the farm, and erected by Mr. Syberg with the help of one man.

Practical Training Essential.

Not only are many young men taking up farming as a profession, but a large number take up an agricultural training with a view to obtaining one of the numerous posts that are now available for the purpose of teaching farmers how to farm, county council lecturers, agricultural organisers, and so forth, so that agricultural training is becoming very much more advanced than it was a generation ago. At the same time it is very important that any boy or youth who intends to take up farming seriously with a view to making a living by it should begin at the right end and obtain a thoroughly practical knowledge of the business before taking up the scientific side. Unfortunately, very many obtain scientific training before going through the practical part, with results that are only to be expected.

To begin with, any boy who is brought up on a farm has an advantage over those who are town bred or have no family connection with farming, as he has had the opportunity of seeing for himself from his earliest childhood all the different phases of animal life and farm work, so that horses and cows, lambs and calves, and their habits and necessities are all quite familiar to him, as well as ploughing and sowing, haymaking and harvesting, and so forth by the time he is old enough to leave home to go to school.

He is often sent on little errands in connection with some matter or other, helps with the animals, perhaps feeds the calves and learns to milk, so that by the time he is ten years old he has a fair idea about farming operations, and if he does not know the why or the wherefore of everything he sees, yet he sees things done; and youthful impressions generally stick. The town-bred boy, on the other hand, sees and knows practically nothing till the time comes for him to leave school, when he is probably sent for a short time on to some farm or other to see how he likes it. This is previous to deciding what course he is to take to learn the art and science of agriculture.

PLATE 171.—MR. A. SYBERG'S MILKING SHED AT MUGGLETON, NEAR ROMA.
Interior, showing bails installed on the echelon principle. The floor is of solid concrete.

Which Course?

The question is: Which is the best course to adopt in each of the above cases to give a boy a thoroughly practical as well as scientific training? It stands to reason that the farm-bred boy and the town-bred boy will need something different in their courses of instruction. The one has everything to learn, the other a great deal, while he has also probably something to unlearn. The only courses of instruction open are a period of pupilage with a thoroughly good and practical farmer and a course at one or other of the agricultural colleges. The great majority of farmers' sons are compelled through force of circumstances to learn what they can at home, supplemented when possible by what they can gather at county council

lectures. Some who are more fortunate are able to have a year or two with some other large farmer, perhaps in another county, where they may have the opportunity of seeing a different and perhaps better and more up-to-date form of management than at home, and then finish up with a year or two at an agricultural college. Those not bred on farms must either go as farm pupils or to a college, or both.

When ?

There can be no question as to the value of a course at an agricultural college in these days when science is becoming more and more applied to agriculture, but the question is when is the best time to have the course. To my mind, it is absolutely essential that before a young man enters an agricultural college he should first of all have had a thoroughly practical training on a farm. If he can

Plate 172.

This well-built and equipped Dairy is on Mr. Syberg's Farm at Muggleton, near Roma. Every practicable provision has been made for ventilation and coolness.

learn to apply science to practice he will stand a chance of succeeding; but if he cannot apply practice to science, or, in other words, if he is full of scientific knowledge and has no practical knowledge, the end will be disastrous.

At the agricultural colleges such subjects as the influences of the various kinds of fertilisers on different soils, on the necessary constituents to plant life, the proper balancing of food rations, and so forth, receive greater attention than the fundamental practical principles of farming. Anyone who is to make a living by farming must thoroughly understand the working of and the management of stock,

how to buy and sell, the management of men and how much work they ought to get through in a day, and how their work should be done, and be able to show them how to do it if they do not know. All these things should be thoroughly learned on a farm before any course is taken at an agricultural college. Then a year or two there, where a knowledge of agricultural chemistry can be acquired together with some scientific knowledge of dairying and veterinary work, will be found a most useful finish to the practical training received on a farm.

Too Much Science.

In agricultural teaching there is nowadays too much science and not enough practice. All our lecturers are brimful of scientific knowledge, and it is hopeless for any young man, however practical he may be, to attempt to get a post as a lecturer unless he has great scientific qualifications. His practical knowledge appears to be of little account, and yet what is wanted is a man who can lecture on the practical principles of farming in every branch, with sufficient scientific training to know where science can be profitably applied to practice. Many of our lecturers talk above the heads of their audience, and some of them try to impart notions which practical farmers know by experience to be utterly impracticable. Many young men who have acquired most of their knowledge of farming at a college have to buy their practical experience when they take a farm to the tune of several hundreds a year for perhaps four or five years.

A hundred a year paid in premium for a few years with a thoroughly sound, practical, and well-educated farmer, followed by a year or so at a college, will save many hundreds of pounds afterwards. Scientific training has undoubtedly done much good in many ways, and has broken down many old-fashioned ideas and prejudices which have been proved to be wrong; but practical principles must be thoroughly installed first. The motto of the R.A.S.E. is "Practice with Science," and on those lines agricultural training should be given. In farming more than in perhaps any other profession or trade an ounce of practical knowledge is worth a ton of theory.

SUBSCRIPTIONS TO THE JOURNAL.

Subscribers are reminded that when a cross is placed in the square on the first page of the Journal it is an indication that the term of their subscription ends with the number so marked, and that it is advisable to renew immediately if they desire the retention of their names on our mailing list.

To farmers, graziers, horticulturists, and Schools of Art the annual subscription—one shilling—is merely nominal, and the charge is only imposed to cover the cost of postage. To them, otherwise, it is an absolutely free issue. Members of agricultural and similar societies who are not actively engaged in land pursuits are asked to pay five shillings a year, while the annual subscription charged to the general public is ten shillings.

Farmers particularly are urged to keep their names on our mailing list, for through the Journal they may keep themselves well informed in respect to the activities of the Department, and other matters with which they are directly concerned. Instead of sending just the annual subscription along it is suggested that, when renewing it, they do so for a longer term. For instance, five shillings would keep their names on our subscribers' register for five years. By doing this they would obviously help to reduce clerical labour as well as avoid the inconvenience to themselves of posting annually the very small sum necessary to keep their names on our mailing list.

On another page an order form may be found, and for those whose annual subscription is about due what is wrong with filling it up now and posting it direct to the Under Secretary, Department of Agriculture and Stock?

Answers to Correspondents.

BOTANY.

The following answers have been selected from the outgoing mail of the Government Botanist, Mr. C. T. White, F.L.S.:—

Emu Apple.

E.G.L. (Maleny)—

The Emu Apple, common in Western Queensland and New South Wales is *Owenia acidula*, the genus Owenia being named in honour of the late Professor Owen of the British Museum. So far as we know neither seeds nor plants are stocked by seedsmen, and your only hope of getting seeds would be to write to a friend in the West in the country where trees are growing. As you remark, it is a beautiful tree, though it seems rather hard to propagate. If you cannot get the Emu Apple, the Tulip Tree (*Harpullia pendula*) is a native tree that does well in your locality, and should be suitable for your purpose. The Queensland Nut (*Macadamia ternifolia*) often also makes a handsome tree, also the Crow's Ash (*Flindersia australis*), though the latter eventually grows rather big for a lawn specimen.

Forget-me-not.

C.S. (Caboolture)—

The specimen is *Cynoglossum australe*, commonly known in Queensland as Forget-me-not, and very closely allied to the true Forget-me-not of Europe. So far as known, neither this plant nor any of its allies possess any harmful properties.

Botanical Specimens from Miles.

INQUIRER (Brisbane)—The specimens collected in the vicinity of Miles have been determined as follows:—

1. *Triodia irritans.* Spinifex.
2. *Amphipogon strictus.* A common grass on poorer soils in the West. I have not heard a common name for it and should consider it of only secondary importance as a fodder.
3. *Andropogon sericeus.* Blue Grass.
4. *Eriochloa annulata.* Dairy Grass.
5. *Tetragonia expansa.* New Zealand Spinnach.
6. *Andropogon refractus.* Barbed-wire Grass.
7. *Chenopodium triangulare.* Fish Weed. A good fodder.
8. *Plantago varia.* Small Plaintain.
9. *Rhagodia linifolia.*
10. *Enchylaena tomentosa.* A Cotton Bush.
11. *Callotus lappulacea.* A "Bindy-eye."
12. *Amphipogon strictus.* Same as No. 2.
13. *Aristida ramosa.* A three-pronged Spear Grass.

Native Frangi-panni.

M.R. (Toowomba)—

Your specimen is *Hymenosporum flavum*, a native tree of the Pittosporaceæ or Pittosporum family. We have heard it called Native Frangi-panni. It is a beautiful tree and well worthy of cultivation for ornamental purposes. It is moderately common in South-Eastern Queensland, particularly along creek banks, but is not confined to such situations.

Finger Cherry or Native Loquat—A Cause of Total and Permanent Blindness.

T.B. (Townsville)—

The specimen is the Finger Cherry or Native Loquat, *Rhodomyrtus macrocarpa*, one of the most dreaded fruits in North Queensland, as it at times contains a poisonous principle which destroys the optic nerve, thereby causing permanent blindness. There is no doubt about the effects of this fruit, as there are quite a number of cases on record of permanent blindness having been caused by it, some of the sufferers now being inmates of the Blind and Deaf and Dumb Institution. It is not known what the poisonous principle is. It has been thought to be a fungus which invades the fruit, but this fungus, or allied forms at least, are found in most over-ripe fruits and are not known to cause harm in any way. The plant contains a saponin, and this has been regarded as the cause of the trouble. Possibly the saponin tends to disappear as the fruits ripen, but of this we have no knowledge. Certain people affirm that they have eaten the fruit both raw and cooked, and no ill effects have followed. However, the danger exists, and it is well not to partake of the fruit at all. The matter is one worthy of investigation, but so far has never been systematically investigated by chemists or medical men.

Stagger Weed or Wild Mint.

D.W.McL. (Rosewood)—

The specimen is *Stachys arvensis*, the Stagger Weed or Wild Mint. Resting stock are usually unaffected by this plant. In feeding experiments with sheep, lambs were seen to be more susceptible than adult sheep. Symptoms are not manifested as a general rule until the sheep ar driven, the distance travelled before the symptoms become apparent varies from a few hundred yards to one or two miles. Cattle so far as we know as unaffected.

Lamb's Tongue.

D.H. (Boggabilla)—

The specimen is *Plantago varia*, a species of Plaintain or Rib Grass. The common Lamb's Tongue of Europe belongs to the same genus and the properties of the Queensland plant, which is very closely allied, are probably the same. The affinities are so close that there is no reason why the present plant should not receive the name Australian Lamb's Tongue.

Hexham Scent. Burr Trefoil.

J.A.F. (Kingaroy)—

The larger plant is the Melilot or Hexham Scent (*Melilotus parviflora*), a fairly common weed in Queensland, particularly on the Darling Downs during the winter and spring months. Some years ago it was boomed as a fodder under the name of King Island Melilot, and has a certain value for land that is not suitable for lucerne or better class fodders. It is apt to taint milk rather badly.

The smaller plant is the Burr Trefoil (*Medicago denticulata*), a very common weed in Queensland during the winter and spring months. It makes quite good fodder for cattle, though in its more succulent stages is apt to bloat them badly if they feed largely on it. As the plant dies off it leaves a mass of burr-like pods, but these are eaten by stock, particularly sheep, and have a definite food value. The plant should make good hay, but we think the specimens you sent are, perhaps, now rather far advanced for that purpose.

Barley Grass.

C.P.C. (Oakey)—

The grass is *Hordeum leporenium*, Barley Grass, a native of the Mediterranean region, now a common naturalised weed in Australia. The grass in its very early stages provides a certain amount of winter fodder, but very quickly loses its palatability and food value as it comes into seed. The seeds are very objectionable as they get into the jaws, eyes, and nostrils of live stock, often causing irritation and sores. It is not worth propagating as a fodder grass in your locality.

"Kangaroo Apple."

H.A. (Tallebudgera)—

Your specimen is the Kangaroo Apple, *Solanum aviculare*, the berries of which are poisonous. The symptoms of poisoning by Solanum berries are usually stupefaction, staggering, loss of feeling and consciousness, cramps, and sometimes convulsions. The pupil of the eye is generally dilated.

New Zealand Spinach. French Catch Fly.

R.O. (Waterford).—The specimens are as follows:—

(*a*) *Tetragonia expansa*, New Zealand Spinach. A common weed in cultivation in Queensland, also found round cowyards, and in fact anywhere where the ground has been disturbed. The leaves are sometimes used as a substitute for ordinary spinach.

(*b*) *Silene gallica*, the French Catch Fly. A European weed now naturalised in most warm countries. It is very common in Queensland, but is not particularly aggressive.

The Prickly Poppy.

J.S. (Kingsthorpe)—

Your specimen is *Argemone mexicana*, the Prickly Poppy, a native of the warmer parts of America, but now naturalised as a weed in most warm countries. It is a very aggressive plant once it gets on to a property and is poisonous, though stock rarely touch it. The only cases that have actually come under our notice of stock eating it is where the plants have been cut down and allowed to wilt. It is gazetted a noxious weed throughout the whole State. It is a thistle-like plant and is sometimes known under the common names of Prickly Thistle, Californian Thistle, &c.

Plant Poisonous to Stock.

W.W.McL. (Murgon)—

No leaves were included in the specimen and those of vine, called by you Wild Grape Vine, are necessary for correct determination. However, the stem looked to us like that of *Vitis acetosa*, which contains a poisonous principle (calcium oxalate) which occurs in the form of crystals in the plant tissues and causes intense irritation of the soft parts of the mouth when the plant is chewed. If, however, poisoning was by this plant, the calves would slobber very much at the mouth with a great flow of saliva, and the mouth would also be somewhat swollen and very painful. We think you must look elsewhere for the trouble. We suggest your sending small pieces of any plant under suspicion down for determination and report. Pieces a few inches should suffice and preferably with either flowers or fruit, but leaves certainly are essential.

Plant Specimens from the Barrier Reef.

T.A.P. (Toowoomba)—The specimens from the Barrier Reef have now been determined as follows:—

1. *Achyranthes aspera*, sometimes called Needle Burr, though this name is applied also to other plants in Queensland.
2. *Stenotaphrum subulatum*. A grass allied to the common Buffalo Grass.
3. *Cordia subcordata*.
4. *Celtis paniculata* as far as can be told from the specimen which bears leaves only.
5. *Abutilon indicum*.
6. *Scaevola Koenigii*. This plant is widely spread over the Malayan region and the Pacific. The pith is sometimes used for the making of artificial flowers.
7. *Tournefortia argentea*.

Tanning Marsupial and Other Skins.

We have received numerous letters asking for instruction in curing and tanning these and other skins. Perhaps the following methods will prove satisfactory:—

The general principle is to trim off the useless parts of the skins and remove all fat from the inside. Then soak the skins in warm water for about an hour. Then apply a coating of borax, saltpetre, and Glauber's salts—1 oz. of each, dissolved in sufficient water to make a thin paste. On the following day give a coating of a mixture of 1 oz. of sal. soda, ½ oz. of borax, and 2 oz. of hard soap. This latter mixture should be slightly heated without allowing it to boil. After this, fold the skin together and leave in a warm place for twenty-four hours. Then take 4 oz. of alum, 3 oz. of salt, and 2 oz. of saluratus; dissolve these in hot water, and, when cool, soak the skin in it for twelve hours. Wring out, and hang up to dry, If you find the skin not sufficiently soft, repeat the soaking and drying two or three times.

Another method is, first to remove the flesh and fat. Then wash the skin in a solution of sal. soda and water. Take 4 oz. of powdered alum, 8 oz. of salt, 1 quart of new milk to 4 gallons of salt water, and 1 pint of prepared starch. Stir well, and then put in your fur skins. Air them often by hanging them over a stick laid across your tan tub. Handle this occasionally until they have been in the liquor for a day or two. Then remove the skins and add to your liquor a half teaspoonful of sulphuric acid. Stir this well into the liquor. Put the skins back and steam them well for about an hour. Then take them out and wring and rinse off in soft lukewarm water, and hang them up in a cool place, and when they begin to get white work and stretch them till they are dry.

Hides of larger animals, such as kangaroos, calves, &c., should remain longer in the solution.

To cure a tough skin, trim it on the flesh side with a sharp knife and then well brush with a solution of 2½ lb. of alum and 1 lb. of common salt in 1 gallon of warm water. The skin should be treated two or three times with this solution on successive days. Now sprinkle bran all over the skin, brush out, and nail the skin to a board to dry it.

Note that each kind of skin requires some special treatment—that is, all skins cannot be tanned in the same manner—but the general principle is the same as above.

Still another method is by what is known as "the lighting tanning process," which is said to be the quickest method of tanning wallaby, rabbit, and other skins and is very simple. It is as follows:—Pour five or six quarts of boiling water over two quarts of bran, and then strain the infusion. Make an equal quantity of salt water, by adding to bloodwarm water as much salt as it will dissolve. Mix the bran and salt water, and to each gallon of the mixture (when no more than lukewarm) add an ounce of sulphuric acid (H_2SO4). Immerse the skins in the liquor, stirring them occasionally until tanned, which will be in about twenty minutes. When tanned, rinse in clean water and hang out in a shady place to dry. Pull and stretch them well while drying. By sufficient pulling they can be made quite white. Dry skins should be soaked in warm water before tanning till they are quite soft and white.

AN INFORMATIVE JOURNAL.

Another Brooklands farmer, in renewing his registration, writes (15*th October*, 1930):—" . . . *There is too much information in the Journal for me to go without it.*"

General Notes.

Skinless Barley Exempted from Operations of Barley Board.

When the Barley Board was constituted it was understood by the growers that the Board would not apply to skinless barley, but only to malting barley. However, the Board was so constituted as to apply to all barley produced in Queensland; but under the Acts the Board is given power to exempt from its operations such sales and purchases or receipts of the commodity as may be prescribed or approved by the Minister. Upon the request of the Board, the Minister for Agriculture and Stock has now approved that all sales of skinless barley shall be exempted from the operations of the Board, and accordingly the Board's operations will in future apply only to malting barley.

South Burnett Tick Cleansing Area.

A deputation of stockowners of the Murgon and Wondai districts, introduced by Messrs. J. B. Edwards and E. H. C. Clayton, M.L.A.'s, waited upon the Minister for Agriculture and Stock (Hon. H. F. Walker, M.L.A.) recently, with reference to the tick cleansing operations in the South Burnett. The members of the deputation pointed out the hardships and inconveniences to stockowners involved, and advocated that the operations be confined to the area originally worked when the cleansing area was first proclaimed. In reply, Mr. Walker stated that he recognised the importance of the matter, and that he had already promised Mr. Edwards, M.L.A., that he would personally visit the area concerned with a view to obtaining first-hand information regarding the position. Mr. Walker also stated that he was in receipt of a counter petition, and at the first opportunity would visit the district in company with representatives of the stockowners concerned, also Departmental officers, and go thoroughly into the question.

Staff Changes and Appointments.

Mr. H. J. Walker, Inspector of Slaughter-houses, Bundaberg, has been also appointed an Inspector of Stock and Brands.

Mr. E. J. Lorraine, Inspector under the Diseases in Plants Act, has been also appointed an Inspector of Stock.

Mr. C. A. Williams, of Goondiwindi, has been appointed an Honorary Inspector under the Diseases in Plants Act.

Mr. S. H. Harding, of Ipswich, has been appointed a member of the Southern District Stallion Board, vice Mr. Ernest Baynes, deceased.

All full-time Inspectors of Stock, Slaughter-houses, Dairies, and Plants, in the employment of this Department have been appointed also Rangers under and for the purposes of the Animals and Birds Acts.

Sanctuary for Animals and Birds at Emu Park.

From 1893 until the present time the only Sanctuary for Animals and Birds at Emu Park has been the Reserve for Water (R. No. 309), on the south-western side of the Emu Park Branch Railway line. This sanctuary has now been extended to include the adjoining Recreation Reserve, R. 311, and, on the opposite side of the railway line, the Reserve for Water, R. 318, and the Reserve for Botanical Gardens, R. 325. Included in this extension of the Sanctuary are also parts of Marine parade, and of Nicholson, Pattison, Pears, and William streets, and also a short length of the reserve for the Emu Park Branch Railway.

Scour in Pigs.

Mr. C. G. Dale, of Lagoon Pocket, Mary Valley Line, Queensland, recently had a young pig seriously affected with blood scour of a type similar to that from which calves occasionally suffer. As the animal was in extreme pain and appeared to be rapidly failing, urgent treatment was necessary, and as there were no other remedies to hand, Mr. Dale administered a dose of two tablespoonful of brandy mixed with white of egg. This stimulating drench had its effect and, in due course, the animal began to pick up again, and in a day or two was on its feet again well on the way to recovery. Such remedies are often effective and are always well worth trial.

Share Dairymen.

We have a number of applications from experienced dairymen, with satisfactory records and the requisite family labour, seeking the working of a dairy herd on shares. Though no responsibility is undertaken, we would be glad to know of any dairy farmer who is contemplating letting his herd on shares, with a view to placing him in communication with the applicants referred to.

Extension of Northern Pig Board for Five Years.

The Northern Pig Board, which was first constituted in 1923, was reconstituted in 1926 for a period of five years as from the 1st January, 1926, and was made to apply to all pigs grown in the Petty Sessions Districts of Atherton, Herberton, Chillagoe, Cairns, Douglas, and Mourilyan during that period. As the Board will expire on the 31st December, 1930, an Order in Council has been issued giving notice of the intention of His Excellency the Governor in Council to extend the Board for a period of five years—that is to say, until the 31st December, 1935. The Order in Council also provides that growers may lodge a petition for a poll to be taken on the question of whether the Board should be so extended or not. Such petition must be signed by not less than 10 per cent. of the pig-growers to which the Board applies —that is, persons who, at any time during the last six months, produced pigs for sale in the Petty Sessions Districts of Atherton, Herberton, Chillagoe, Cairns, Douglas, and Mourilyan. The petition, if any, must reach the Minister on or before the 10th November, 1930.

Nominations for Growers' Representatives.

Nominations will be received by the Returning Officer, Department of Agriculture and Stock, until 5 p.m. on the 10th November, 1930, for election for one year as Growers' Representatives on the Northern Pig Board.

Five such representatives are to be elected by those persons who, at any time since the 16th June, 1930, kept pigs in any of the Petty Sessions Districts of Atherton, Herberton, Chillagoe, Cairns, Douglas, and Mourilyan.

Each nomination is to be signed by at least then such growers.

If more than five nominations are received, a postal ballot will be taken, and the election, if any, will be held on the 17th December, 1930.

To ensure their names being on the roll, persons eligible to vote at this election are invited to send their names and addresses at once to Mr. A. H. Jones, Returning Officer, Department of Agriculture and Stock, Brisbane.

The Roadside Market for Fruit and Vegetables.

In recent years, largely as the result of the growth of motor traffic, a new and often profitable outlet for their products has presented itself to fruit and vegetable growers in the form of the roadside market. In some cases it is the practice of the grower merely to set up a sign directing the attention of the traveller to the fact that produce is procurable from his property, while others find it advantageous to set up a stall on the roadside adjacent to it. Others yet again, situated less favourably in regard to traffic, erect a stall on the roadside in some more suitable place.

In the establishment of this type of market certain points must be observed. The stall should be situated on that side of the road on which the bulk of the traffic passes on the homeward journey. The convenience of the potential buyer should be studied. The stall should not, for instance, be located on a steep hillside; a better point would be on the hilltop. Warning notices could with advantage be set up on the hill, however, the slow speed necessitated by the climb giving the traveller ample time to read them. What might be called psychology of such advertising is rather doubtful. A smart, attractive sign, it might be argued, is the surest sales-getter, but it would appear from the experience of an American grower that the laws operating are somewhat subtle. An up-to-date sign, he found, was much less effective than one of a less pretentious sort, travellers presumably fearing that such advertising betokened a shrewdness which made the chances of bargains proportionately remote. It is advisable to have the prices of the commodities on roadside stalls plainly displayed.

Weighing Butter for Moisture Tests.

In making a test for moisture in butter, the weighing of t e samples in the orthodox manner by means of a chemist's scales takes too much time for the factory operative who is not skilled in handling the weights, or is not quick at figures. The use of the scales and method of calculation of test results may be simplified in this way:—

Exactly balance the evaporating cup on one scale pan by means of a weight on the other. This weight may be made from sheet lead or other metal. If the piece of metal is cut to as nearly as possible the same weight as the cup, any further necessary adjustment may be made by means of the screw-nuts on the ends of the scale beam.

In making the test, first see that the empty cup and the weight exactly balance, then place a ten gram weight on the scale pan with the aforesaid weight. Now place sufficient of the prepared butter sample in the cup to again balance the scales. The sample in the cup will then weigh exactly ten grams. Evaporate the moisture in the usual way. Cool the cup and sample. Then again, balance the scales by placing the necessary weights on the scale pan with the cup and sample.

The percentage of moisture may then be read direct from the total of the latter weights by shifting the decimal point one place to the right, thus, if the weights required to re-balance the scales after the moisture in the sample has been evaporated total 1.56 grams, then the percentage of moisture is 15.6.—F. J. Watson, Dairy Instructor.

Cost of Loss of Milk Fat in Separating Milk.

Every dairyman knows that loss of milk-fat in separating means to him a loss of money, but many do not realise the extent of the loss even when the result of the Babcock test of the separated milk is known.

In separating, a small amount of fat, which is not recoverable by mechanical separation, is always lost; but should the amount exceed 0.05 per cent., either the mechanism or the manipulation of the separator is at fault.

The following table will give some idea of what extent the loss will be when the actual waste of fat exceeds the amount not recoverable by mechanical means.

Presuming the average yield is the modest amount of one pound of commercial butter to twenty-five pounds of milk, the loss will be as follows:—

Loss of				equal to loss of				in			
0.01	per cent.	is		1	lb.	in	400	lb.	com.	butter
0.02	„	„		200	„					
0.03	„	„		133	„					
0.04	„	„		100	„					
0.05	„	„		80	„					
0.06	„	„		66	„					
0.07	„	„		57	„					
0.08	„	„		50	„					
0.09	„	„		44	„					
0.1	„	„		40	„					
0.2	„	„		20	„					
0.3	„	„		13.3	„					
0.4	„	„		10	„					
0.5	„	„		8	„					
0.6	„	„		6.6	„					
0.7	„	„		5.7	„					
0.8	„	„		5	„					
0.9	„	„		4.4	„					
1.0	„	„		4	„					

On the same basis of yield of butter from milk, a herd of cows producing 50 gallons of milk per diem will produce in one year 187,062 lb. of milk yielding 7,482 lb. of commercial butter, which at 1s. 3d. per lb. is worth £467 12s. 6d.

A loss of 0.01 per cent. of fat in separating would mean a loss for the year of £1 3s. 4½d.; a loss of 0.1 per cent. would cause a loss of £11 13s. 9d.; and a loss of 1 per cent. would be equivalent to £116 17s. 6d.

By this it will be seen how necessary it is that the separator should me maintained in perfect order and be operated continually at full speed when separating.—F. J. Watson, Dairy Instructor.

The Home and the Garden.

OUR BABIES.

Under this heading a series of short articles by the Medical and Nursing Staff of the Queensland Baby Clinics, dealing with the welfare and care of babies, has been planned in the hope of maintaining their health, increasing their happiness, and decreasing the number of avoidable cases of infant mortality.

SAVE THE BABIES.

A Season of Danger for the Infant.

The hot season is coming. Probably more babies will die during the next three months than during any other three months of the year. It is (though it should not be) the dangerous season for babies. They will die of an infectious and preventable disease. Save the babies!

Last year 112 babies under one year died in Queensland of this disease; the year before 214 died—nearly twice as many. Have our Baby Clinics doubled the efficiency of their work in the past year? Are our Queensland mothers twice as wise? We wish it were so. A part of the decrease may be due to better mothercraft. Most of it was due to good luck. Possibly this year we may have bad luck. The summer before last Rockhampton suffered from a summer epidemic which killed fifty-one babies under two years of age in three months. This season some other town may be threatened by a similar epidemic. Shall we trust our infants' lives to luck, to chance, to fortune? Save the babies!

Summer diarrhœa, dysentery, gastro-enteritis, by whatever name you like to call it, is an infectious disease. It is caused by dysentery bacilli, which are carried about by flies. It is not caused directly by hot weather. Nor has the Jacaranda, which happens to flower at this time of year, anything to do with it. The infection is never present in freshly boiled or scalded milk, for boiling kills dysentery bacilli. If the milk was stale and dirty before boiling, it will give babies simple diarrhœa; it cannot give them dysentery. The milk may be infected after boiling, so may any kind of artificial food, so may the baby's bottles, teats, and dummies. Those who sell dried milks or patent foods may suggest that in them lies perfect safety. It is not true. Foolish beliefs put into mothers' heads are paid for in infants' lives. Save the babies!

Natural Food for the Young Australian.

Save your babies by giving them their natural food—the only food which is perfectly clean, fresh, and safe. Never wean a baby during the next three months if you can possibly help it. If you must wean it, or if it has been weaned already, exercise the utmost care. Scald the milk, scald the bottles, scald the teats, then keep them most carefully covered from flies. Every single fly may carry death for your babe, or, failing death, an anxious, painful, and enfeebling disease. The strongest and finest baby may die of it. Nothing can make the dummy safe. It is a perpetual attraction to flies. Burn it. You may think that the dummy keeps your baby from crying and makes him happier. You are mistaken; but even if you are right, it is better that some babies should cry a little than that one healthy baby should die of dysentery. Be warned in time. Save the babies!

The Responsibility of Local Authorities.

And you Municipal and Shire Councillors, you are partly responsible. The flies get most of their dysentery bacilli from your closet pans. No doubt you have excellent Regulations to prevent flies from getting access to these pans. Do you enforce those Regulations? Have you sufficient and efficient Inspectors? Do you prosecute? Unless you prosecute a few careless people, your Regulations are useless. Save the Babies!

Keep Cool.

We do not say that every mother who does her best will never lose her baby. That would not be fair nor true. There is no perfect safety for anyone in this world. But we do say that such cases will be very rare. There is no need, nor excuse, for foolish panic. Keep cool. Be very careful. Try not to make a single mistake. If you are in any difficulty, consult the Nurse at the Baby Clinic. She is always willing and anxious to help. If you live too far off, ask for a copy of the Queensland Mother's Book. It will be sent on application. Read it carefully. The lives of our Queensland babies are in the hands of our Queensland mothers. Resolve that this summer you will do your very best, God helping you. SAVE THE BABIES!

THE COMPOST HEAP.

The compost heap is a valuable adjunct to the farm, and especially on small areas, where some intensive form of agriculture, such as vegetable growing, is being carried out. A heap or pit can be made very economically. It utilises all sorts of vegetable and animal refuse which would otherwise be wasted, and converts it into a valuable manure, rich in vegetable matter and eminently suited for soils low in humus or subject to droughty conditions.

The principle of the compost heap is the fermentation of easily decomposed vegetable matter in the presence of earth and lime. Not only are substances like peat and straw, which form the usual basis of compost heaps, thus decomposable, but almost every kind of organic substance, both of vegetable and animal origin, can be composted. Dead leaves, bush scrapings, sawdust, weeds, tops and stalks of vegetables, as well as bone and animal refuse, can be treated in this manner. In the case of animal refuse the operation is much slower, and substances like bone should be first crushed. It is also important to be sure that animal refuse so treated is not derived from a diseased source.

The best way of making and maintaining the compost heap will depend largely upon local surroundings. As a general method of procedure the following will be found satisfactory. Make a heap with alternate layers of earth, refuse, and lime. Under the term "refuse" is included all the refuse material of animal or vegetable origin mentioned above. Cover the whole with a layer of earth. When a sufficient quantity of refuse is again collected, place it on top of the heap and cover with a layer of lime, and lastly of earth, until the heap is 3 to 4 feet high. The heap should be kept moist, and for this purpose all refuse water from the house, slops, &c., should be added. The heap may be conveniently watered by making a hole in the interior and pouring the liquid in. The final covering with earth has the object of absorbing any ammonia which is evolved in the process of fermentation and by the action of the lime.

When the heap has been prepared it must be left to itself to ferment for a greater or less time. Probably a few months will be sufficient, unless very refractory substances, such as bone, &c., are present. In a few months' time it should be well forked over and another layer of lime and finally of earth should be added. In the course of another month or two it should be ready for use, and will provide at a very slight cost an excellent manure rich in humus, and will have utilised for the purpose a great amount of refuse material which would otherwise have been lost or burnt.

When refuse material is burnt, the ashes, though still possessing manurial value on account of the line, potash, and phosphates they contain, are of incomparably less value than the original substances out of which they are derived, owing to the absence of humus material and of nitrogen, which have been lost in the process of burning.

Instead of a heap, the compost may be conveniently prepared in a pit. In either case the bottom should be cemented, or so drained that the liquid escaping from the mass can be collected and returned to the compost.

It will be found advantageous to prepare a second heap while the first one is ripening and being used. It will also be found that if it is desired to use more concentrated fertilisers, such as superphosphate, potash, and ammonium salts, these can be mixed with advantage with the compost manure before it is applied to the land. Used in this way they will be in less danger of leaching away, and will be of greater benefit than if applied directly to the land.

Orchard Notes for December.

THE COASTAL DISTRICTS.

The planting of pineapples and bananas may be continued, taking care that the ground is properly prepared and suckers carefully selected, as advised previously in these Notes. Keep the plantations well worked and free from weeds of all kinds, especially if the season is dry. New plantations require constant attention, in order to give young plants every chance to get a good start; if checked when young they take a long time to pull up and the fruiting period is considerably retarded. Small areas well worked are more profitable than large areas indifferently looked after, as the fruit they produce is of very much better quality. This is a very important matter in the case of both of these fruits, as with the great increase in the area under crop there is not likely to be a profitable market for inferior fruit. Canners only want first-class pines of a size that will fill a can, and cannot utilise small or inferior fruit, except in very limited quantities, and even then at a very low price. Small, badly filled bananas are always hard to quit, and with a well-supplied market they become unsaleable. Pineapple growers, especially those who have a quantity of the Ripley Queen variety, are warned that the sending of very immature fruit to the Southern markets is most unwise, as there is no surer way of spoiling the market for the main crop. Immature pineapples are not fit for human consumption, and should be condemned by the health authorities of the States to which they are sent.

Citrus orchards require constant attention; the land must be kept well worked and all weed growth destroyed. Spraying or cyaniding for scale insects should be carried out where necessary. Spraying with fungicides should be done where the trees show the need of it. A close lookout must be kept for the first indications of "maori," and as soon as it is discovered the trees should either be dusted with dry sulphur or sprayed with the lime-sulphur, potassium, or sodium sulphide washes. Borer should be looked for and destroyed whenever seen.

Early grapes will be ready for cutting. Handle carefully, and get them on to the market in the best possible condition. A bunch with the bloom on and every berry perfect will always look and sell well, even on a full market, when crushed and ill-packed lines are hard to quit.

Peaches, plums, papaws, and melons will be in season during the month. See that they are properly handled. Look out for fruit fly in all early ripening stone fruit, and see that none is left to lie under the trees to rot and thus breed a big crop of flies to destroy the mango crop when it ripens.

Keep leaf-eating insects of all kinds in check by spraying the plants on which they feed with arsenate of lead.

Look out for Irish blight in potatoes and tomatoes, and mildew on melons and kindred plants. Use Bordeaux or Burgundy mixture for the former, and finely ground sulphur or a sulphide spray for the latter.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

Early ripening apples, plums, apricots, peaches, and nectarines will be ready for marketing during the month. They are unsatisfactory lines to handle, as the old saw, "Early ripe, early rotten," applies to all of them; in fact, the season of any particular variety is so short that it must be marketed and consumed as quickly as possible. All early ripening deciduous fruits are poor carriers and bad keepers, as their flesh is soft and watery, deficient in firmness and sugar, and cannot, therefore, be sent to any distant market. The available markets are quickly over-supplied with this class of fruit, and a glut takes place in consequence. Merchants frequently make the serious mistake of trying to hold such fruits, in the hope of the market improving, with the result that, instead of improving, the market frequently becomes more and more congested, and held-over lines have to be sent to the tip. There is only one way to deal with this class of fruit, and that is to clear the markets daily, no matter what the price, and get it distributed and into consumption as rapidly as possible by means of barrowmen and hawkers. Most early ripening fruits are useless for preserving in any way, their only value being what they will bring for consumption whilst fresh. This being so, it is only a waste of time and money to forward immature, undersized, and inferior fruit to market, as it is not wanted, and there is no sale for it. It should never have been grown, as it is frequently only an expense to the producer, besides which, unless the fallen or over-ripe fruit is regularly and systematically gathered and destroyed in the orchard, it becomes a breeding ground for fruit fly and codlin moth, as well as of fungi, such as those producting the brown and ripe rots. Early ripening fruits should, therefore, be carefully graded for size and quality, handled, and packed with great care, and nothing but choice fruit sent to market. If this is done, a good price will be secured, but if the whole crop—good,

bad, and indifferent—is rushed on to the local markets, a serious congestion is bound to take place and large quantities will go to waste.

Orchards and vineyards must be kept in a state of perfect tilth, especially if the weather is dry, so as to retain the moisture necessary for the development of the later ripening fruits. Where citrus fruits are grown, an irrigation should be given during the month if water is available for this purpose, excepting, of course, there is a good fall of rain sufficient to provide an ample supply of moisture.

Codling moth and fruit fly must receive constant attention and be kept under control, otherwise the later-ripening fruits are likely to suffer severely from the depredations of these serious pests.

Grape vines must be carefully attended to and sprayed where necessary for black spot or downy mildew, or sulphured for oidium. Where brown rot makes its appearance, spraying with the potassium or sodium sulphide washes should be carried out. Leaf-eating insects of all kinds can be kept in check by spraying with arsenate of lead.

Farm Notes for December.

Although November is regarded generally as the best period for planting the main maize crop, on account of the tasseling period harmonising later on with the summer rains, December planting may be carried out in districts where early frosts are not prevalent, provided a known quick maturing variety of maize is sown.

To ensure a supply of late autumn and winter feed, dairymen are advised to make successive sowings of maize and sorghums, to be ultimately used either as green feed or in the form of silage. The necessity for such provision cannot be too strongly urged. Farmers who have not had any experience in building an ensilage stack can rest assured that, if they produce a crop for this purpose, information and instruction on the matter will be given on application to the Under Secretary for Agriculture and Stock; also that, whenever possible, the services of an instructor will be made available for carrying out a demonstration in ensilage-making for the benefit of the farmer concerned and his immediate neighbours.

In districts and localities where supplies of lucerne are not available, sowings of cowpeas should be made, particularly by dairymen, as the lack of protein-yielding foods for milch cows is a common cause of diminished milk supplies and of unthriftiness of animals in dairy herds. Cowpeas and lucerne can be depended upon to supply the deficiency. The former crop is hardy and drought-resisting. When plants are to be used as fodder, it is customary to commence to feed them to stock when the pods have formed. Animals are not fond of cowpeas in a fresh, green state, consequently the plants should be cut a day or two before use. Economy is effected by chaffing beforehand, but the plants can also be fed whole. Chaffed in the manner indicated, and fed in conjunction with green maize, or sorghum, when in head, in the proportion of one-third of the former to two-thirds of the latter, a well-balanced ration is obtainable. Animals with access to grass land will consume from 40 to 50 lb. per head per day; a good increase in the milk flow is promoted by this succulent diet. The plant has other excellent attributes as a soil renovator. Pig-raisers will find it invaluable also.

A great variety of quick-growing catch crops, suitable for green fodder and ensilage purposes, may also be sown this month, notably Sudan grass, white panicum, giant panicum (liberty millet), Japanese millet, red and white French millet. Well prepared land, however, is required for crops of this description, which make their growth within a very limited period of time. French millet is particularly valuable as a birdseed crop, the white variety being more in favour for this purpose.

Successive sowings may be made of pumpkins, melons, and plants of this description.

In districts where onions are grown, these will now be ready for harvesting. If attention is given, in the case of garden plots, to bending over the tops of the onions, maturity of the crop is hastened. Evidence will be shown of the natural ripening-off process, and steps should be taken to lift the bulbs and to place them in windrows until the tops are dry enough to twist off. If a ready market is not available, and it is decided to hold over the onions for a time, special care should be taken in handling. Storage in racks in a cool barn is necessary; otherwise considerable deterioration is to be expected. Improved prices are to be looked for in marketing by grading and classifying produce of this description.

Cotton areas which were subjected to a thorough initial preparation, thereby conserving a sufficiency of moisture for the young plants, should now be making good headway and sending their taproots well down. Keep down all weed growth by scarifying as long as the growth will admit of horse work.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S., AND A. C. EGLINTON.

TIMES OF SUNRISE, SUNSET, AND MOONRISE.

AT WARWICK.

	November, 1930.		December, 1930.		MOONRISE. Nov. 1930.	MOONRISE. Dec. 1930.
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Rises.
					p.m.	p.m.
1	5.5	6.7	4.52	6.30	1.31	1.55
2	5.4	6.7	4.52	6.30	2.25	2.53
3	5.4	6.8	4.52	6.31	3.17	3.51
4	5.3	6.8	4.53	6.32	4.11	4.52
5	5.2	6.9	4.53	6.33	5.16	5.57
6	5.2	6.10	4.53	6.34	6.16	7.0
7	5.1	6.10	4.53	6.34	7.8	8.5
8	5.1	6.11	4.53	6.35	8.11	9·6
9	5.0	6.12	4.53	6.35	9.13	10.1
10	4.59	6.13	4.54	6.36	10.15	10.47
11	4.59	6.14	4.54	6.37	11.13	11.26
12	4.58	6.15	4.54	6.38	...	...
					a.m.	a.m.
13	4.58	6.16	4.54	6.38	12.5	12.1
14	4.57	6.16	4.54	6.39	12.49	12.35
15	4.57	6.17	4.54	6.39	1.25	1.8
16	4.56	6.18	4.55	6.40	2.0	1.40
17	4.56	6.19	4.55	6.40	2.32	2.16
18	4.56	6.20	4.56	6.41	3.6	2.55
19	4.55	6.21	4.56	6.41	3.40	3.40
20	4.55	6.22	4.57	6.42	4.18	4.32
21	4.55	6.23	4.57	6.43	5.0	5.27
22	4.54	6.23	4.58	6.43	5.48	6.23
23	4.54	6.24	4.58	6.44	6.43	7.20
24	4.53	6.25	4.59	6.44	7.40	8.15
25	4.53	6.25	4.59	6.45	8.35	9.12
26	4.53	6.26	5.0	6.45	9.31	10.4
27	4.53	6.27	5.0	6.46	10.27	10.57
28	4.52	6.27	5.1	6.46	11.22	11.49
29	4.52	6.28	5.1	6.46	12.15	12.41
30	4.52	6.29	5.2	6.47	1.7	1.36
31	...	...	5.3	6.47	...	2.34

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhat about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

[All the particulars on this page were computed for this Journal, and should not be reproduced without acknowledgment.]

Phases of the Moon, Occultations, &c.

4 Nov.	○	Full Moon	8 28 p.m.
13 ,,	☽	Last Quarter	10 27 p.m.
20 ,,	●	New Moon	8 21 p.m.
28 ,,	☾	First Quarter	4 18 p.m.

Perigee, 15th November, at 4.30 p.m.
Apogee, 28th November, at 8.54 a.m.

Mars will, technically, be in conjunction with the Moon on the 13th at 3 a.m., when nearly due north-east; in reality it will appear to be 3 degrees (six diameters of the Moon), to the south of it.

As the Sun will seem to be passing through the constellation Libra in November, reaching Alpha on the 4th, this constellation will be above the horizon all day and not noticeable except in the case of a few of its stars in the west after sunset early in the month. During the last week in November some of the stars in the northern part of Scorpio will be nearest to the Sun.

The grouping of the Moon, Venus and Mercury, nearly in a line with the Sun on the 20th, will be invisible, but should be noted.

Venus will set at 8.29 p.m. on the 1st, and at 7.16 p.m. on the 15th.

Mars will rise at 12.29 a.m. on the 1st, and at 11.57 p.m. on the 15th.

Jupiter will rise at 11.30 p.m. on the 1st and at 10.36 p.m. on the 15th.

Saturn will set at 10.33 p.m. on the 1st and at 9.44 p.m. on the 15th.

About 46 degrees southward of the Sun the Southern Cross will be up all day and getting so near the southern horizon at 8 p.m. as to be invisible.

6 Dec.	○	Full Moon	10 40 a.m.
13 ,,	☽	Last Quarter	6 7 a.m.
20 ,,	●	New Moon	11 24 a.m.
28 ,,	☾	First Quarter	1 59 p.m.

Perigee, 10th December, at 11.42 a.m.
Apogee, 26th December, at 5.48 a.m.

The occultation of the fine star Beta Tauri about one hour after midnight on the 6th instant will be noticeable at all places south of Townsville, north of which the star will be seen below the northern edge of the Moon. This should form an interesting occurrence for all observers with telescopes, field-glasses, or even small binoculars.

When Jupiter and the Moon rise together on the 8th, soon after 9 p.m., the planet will be only 5 degrees distant from the Moon on its southern side. The Moon, being full only two days before, will be too bright for observers to see the stars of Gemini in its immediate neighbourhood.

Jupiter will be apparently very near the place now occupied by the ninth planet Pluto.

The apparently near approach of the quickly moving planet Mercury to slow and stately Saturn will culminate on the 15th, when Mercury will be only 2½ degrees from the bigger planet on its northern side. They will be well situated for observation after sunset, the planets being about 22 degrees above the horizon at that time.